

# BULLETIN OF MISCELLANEOUS INFORMATION No. 10 1930 ROYAL BOTANIC GARDENS, KEW

## L.—A NEW GENUS OF IRIDACEAE FROM EAST AFRICA. A. A. BULLOCK.

The fact that the high mountain flora of East Africa is still far from completely known is illustrated by the number of apparently new species which occur in almost every collection from that area received at Kew for determination. Many of the new species have perforce to remain undescribed until revisions are published of the genera concerned. The facies of the present plant, however, is so strikingly different from that of its nearest allies that it was decided to make it the subject of a special investigation.

Specimens of the plant have been received at Kew on two occasions, in each case from Mount Elgon, at about 9000 ft. above sea level. It was first collected by Mr. C. H. Lankester in August, 1921, and was then provisionally named *Antholyza* sp. Exactly eight years later it was collected again by Messrs. Hancock and Soundy during an entomological excursion on the mountain.

No material of the species is incorporated in the British Museum Herbarium, and none was found in the Berlin Herbarium by Miss M. L. Green, who kindly made a search there on my behalf. The plant is not mentioned in the account of the Iridaceae in the new edition of the *Pflanzenfamilien*, Band 15a, 463-505, by Dr. L. Diels. It was unknown to him, and he suggested that it would probably prove to be a new genus. This view is also endorsed by Mr. N. E. Brown, an acknowledged authority on the family.

The new genus unquestionably belongs to the tribe Ixieae, and seems to be most closely allied to *Gladiolus*, *Antholyza* and *Watsonia*, from all of which it may be distinguished at once by the large coloured bracts which hide the flowers almost completely. Its deeply bifurcate style-arms separate it from *Gladiolus* and *Antholyza*, and the winged seeds from *Watsonia*, from which it differs also in the shape of the style-arm branches.

*Oenostachys* Bullock, gen. nov. ex affinitate *Gladioli* Linn. *Antholyzae* Linn. et *Watsoniae* Mill., a quibus spatharum valvis coloratis perianthium includentibus differt; a *Gladiolo* et *Antholyza* styli ramis bifurcatis, a priore etiam tubo pro longitudine limbi multo longiore recedit; a *Watsonia* seminibus alatis, styli ramis aliter bifurcatis distincta.

*Perianthii* tubus arcuatus, parte tertia inferiore cylindricus, duabus partibus superioribus leviter dilatatus; limbi segmenta

exunguiculata, inaequalia, 3 inferiora minora. *Stamina* 3, perianthii tubi partis cylindricae fauce inserta; filamenta filiformia, arcuata; antherae inclusae oblongo-sagittatae. *Ovarium* triloculare; ovula numerosa, superposita; stylus filiformis parte tertia superiore trifidus, ramis bifidis subpatulis, stigmatibus anguste spathulatis. *Capsula* obconica, anguste trialata, loculicide 3-valvis. *Semina* plana, elliptica, late alata, alis spongosis.—*Cormus* tunicatus. *Folia* disticha, ensiformia. *Spica* simplex, spathis persistentibus, valvis exterioribus latissime obovatis perianthium includentibus laete coloratis imbricatis, valvis interioribus multo minoribus oblanceolatis haud coloratis. *Flores* in spathis solitarii, subsessiles.

**O. dichroa** *Bullock*, sp. nov. unica.

*Cormus* ignotus, sed (ut videtur e foliorum basibus), verosimiliter tunicis membranaceis reticulatis praeditus. *Folia basalia* 30–50 cm. longa, usque 1.5 cm. lata, nervis prominentibus. *Caulis* teres, usque 5 mm. diametro, 50 cm. altus, folia compluria minora gerens. *Spica* subsecunda, usque 25 cm. longa. *Spathae* valva exterior obovata, circiter 6 cm. longa et 4 cm. lata, subacuta. *Perianthium* 5–6 cm. longum; lobi 3 superiores albi, lobo medio ovato 1 cm. longo, lateralibus lanceolatis; lobi 3 inferiores virides, lanceolati, 7 mm. longi. *Stamina* contigua, perianthii segmento summo plus minus adpressa; filamenta rubra; antherae 1 cm. longae. *Capsula* 1.5 cm. longa, membranacea, reticulata. *Semina* 5–7 mm. longa.

UGANDA PROTECTORATE: Mount Elgon, alt. 9000–10,000 ft., 23 Aug. 1921, C. H. Lankester s.n. (type); Mount Elgon, Alpine Zone, alt. 9000 ft., Aug. 1930, G. L. R. Hancock & W. Soundy 34.

This very striking plant, Mr. Hancock informs me, is very common on Mount Elgon above an altitude of 9000 ft. and it is indeed remarkable that it has not previously been described.

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**LI.—CONTRIBUTIONS TO THE FLORA OF TROPICAL AMERICA: III.\*** ANNONACEAE COLLECTED BY THE OXFORD UNIVERSITY EXPEDITION TO BRITISH GUIANA, 1929.  
N. Y. SANDWICH.

The Annonaceae of British Guiana have received little attention in recent years except for the description of one or two new species by Safford or by R. E. Fries. Those of Surinam and French Guiana seem to be better worked out, but several species were described by de Candolle in the first volume of the *Systema* from material in Lambert's Herbarium collected in Cayenne by Martin, and at least three of these types could not be found on a recent search in the British Museum Herbarium. On the other hand, several of Aublet's types which Sagot could not find in Paris in 1881 are to be seen at South Kensington. A useful key to the Guiana species of *Duguetia* is given by R. Benoist in Lecomte, *Not. Syst.* iv. 58 (1923).

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\*Continued from *K.B.* 1930, p. 343.



Meanwhile large quantities of material of this family from British Guiana have been accumulating at Kew, and in several instances there are numerous sheets of unnamed species which appear to be endemic and plentiful in the colony. The numerical importance in the rain-forest of Guiana of this arborescent family was realised by the botanists of the Oxford University Expedition to British Guiana last year. Within a two-mile radius of their camp on the Moraballi Creek, which flows into the right bank of the Essequibo River some ten miles above Bartica, they collected material of fourteen different species of Annonaceae. This representation was only equalled (in the arborescent families) by the Rosaceae, Lecythidaceae and (nearly) by the Sapotaceae, apart from the Leguminosae which, of course, were the dominant family.

These species fall into three groups, defined by their habit. Seven of them were trees of middle-size or even members of the top storey of the forest-type in which they were found; to this group belong the genera *Guatteria*, *Xylopia*, *Unonopsis*, *Rollinia*, and *Annona*. The tallest of these, *Xylopia cinerea*, was 125 ft. high and only 16 inches in diameter; while the smallest, *Xylopia Benthami*, was 45 ft. high and only 5 inches in diameter, but this species is a characteristic member of the wallaba forest, on light dry sandy soil on the top of ridges, where there is plenty of light, and the trees are all lower. Four of these species are described as new, and two of them seem not to have been collected before; both are species of the genus *Xylopia*, the American representatives of which have just been monographed in the *Acta Horti Bergiani* by R. E. Fries. The relative frequency of some of the species of this group in sample plots of the different types of forest will, it is hoped, appear in a subsequent paper on the ecology of the area by Messrs. T. A. W. Davies and P. W. Richards.

The second group is comprised of low shrubs and trees varying from a height of about 8 to 25 feet. This was represented by six species in the genera *Duguetia* (4), *Anaxagorea* and *Cymbopetalum*, of which four are described here for the first time. These small Annonaceous trees are certainly the dominant constituent of the bottom storey of several types of forest, and appear to be abundant and widely distributed in the colony. They provide a welcome relief to the collector who has been accustomed to a largely herbaceous flora, since their flowers and fruits are always within easy reach. It is hoped that notes on their occurrence in different forest-types will be included in the ecological paper referred to above; two of them, *Duguetia inconspicua* and *Cymbopetalum brasiliense* were only once found, but the others—all new species—were very plentiful. The Arawak Indians distinguish each of them by a special name, and use them in preference to any other small tree for poles and fishing-rods.

Finally, a single very remarkable species was found with a scandent habit. It was not a "bush-rope" in the usual sense, but

seemed to be a weak tree with a slanting growth which became scandent and horizontal on approaching the canopy. The beautiful red flowers with wide-spreading outer petals were conspicuous on the forest floor. This species is immediately identified with *Annona haematantha* Miq. of Surinam. Another scandent member of the Annonaceae, in the genus *Guatteria*, is mentioned below as it has been wrongly named for many years ; it has been variously described by collectors as a liane, vine, large bush-rope, and " frutex sarmentosus, altissime scandens."

It is to be hoped that future collectors in British Guiana will be stimulated to collect the Annonaceae extensively and carefully in all stages of their development. Numbers of new species must await discovery, and others already known from surrounding countries will probably be found. Few families of trees seem to present a greater variation in the size of the leaf and its acumen, even on the same branchlet ; while the degrees of size of the flowers and carpels, dependent upon age, appear most perplexing in the herbarium, when a representative series is not collected from the same tree. This is particularly true of some of the small species, which do not bear many flowers or fruits, and which have rarely been collected.

The species which were collected by the Oxford Expedition are enumerated below, and a few notes are included dealing with other points which have come to light in the course of the investigation ; an alphabetical list of the vernacular names is appended.

**Uvaria ? spectabilis** DC. Syst. 1.484 (1818).

Martin's type specimen in Hb. Lambert has been seen at the British Museum and proves to be **Fusaea longifolia** (Aubl.) Safford. Incidentally, this name antedates *U. spectabilis* A. Chev. ex Hutch. et J. M. Dalz. cum Chipp in Fl. West Trop. Africa, 1. i. 47, 50 (1927) ; but it is possible that the latter species will be transferred to the genus *Uvariadendron*, see R. E. Fries in Acta Horti Bergiani, Band 10, no. 1. 52 (1930).

**Guatteria atra** Sandwith, sp. nov. ; *G. Ouregou* (Aubl.) Dun. affinis, cortice aterrimo nec cinereo, foliis subtus glaucescentibus, tori fructiferi parte ima conspicua quam parte gynophora convexa latiore, carpellis majoribus differt.

*Arbor* excelsa, cortice aterrimo, materie flavescente ; ramuli summi nigrescentes, apice novello adpresse piloso excepto glabri. *Folia* elliptica vel elliptico-oblonga, apice satis breviter atque late obtuse acuminata, basi in petiolum cuneatum attenuata, 6-20 cm. longa, 2.5-7 cm. lata, rigide chartacea vel subcoriacea, supra nitida siccitate olivaceo-brunnea, subtus opaca glaucescentia glaucescine deterrenti, supra glabra, subtus sub lente sparse obscure adpresse pilosa, novella nondum evoluta sericea, utrinque crebre subtiliter sed haud conspicue reticulata, nervis primariis utroque costae latere circiter 16 arcuantibus subtus prominentibus ; petiolus nigrescens supra canaliculatus subalatus, 0.6-1 cm. longus, pilosulus vel



glabrescens. *Inflorescentia* axillaris, 1-2-flora; pedicelli adpresse pilosi, 1.5-2.2 cm. longi, satis crassi, versum apicem ad 2.5 mm. sensim dilatati; bracteolae infra medium pedicellum minutae, amplexantes, conspicue pilosae. *Sepala* triangulari-ovata, 7-8 mm. longa, 6-9 mm. lata, statu vivente viridia, extra dense adpresse pilosa, intus pallide ferrugineo-tomentosa. *Petala* patula, coriacea, oblonga vel obovato-oblonga, obtusa, margine undulata, statu vivente glauco-viridia, siccitate prope basim externam atque secus medium pallide ferrugineo-sericea, ceterum passim basi interna glabra excepta glauco-tomentella; exteriora 1.2 cm. longa, 6 mm. lata; interiora majora, 1.2-1.4 cm. longa, 7.5-8.5 mm. lata. *Torus* fundamentum 7-8 mm. diametro, tum cratere extra staminifero intus pistillifero haud alte elevato 4-5 mm. diametro. *Stamina* statu vivente albo-flava, 1.5 mm. longa, filamentis vix distinguendis; pars connectivi apice producta anthera latior, plano-convexa, ut videtur glabra, ad 1 mm. lata. *Pistilla* numerosa, dense conglutinata; ovarium arcuato-ellipsoideum, conspicue pallide ferrugineo-pilosum, fere ad 1.5 mm. longum; stylus clavatus, circiter 1 mm. longus, inferne glaber, stigmate tomentello statu vivente viridi. *Carpella* juniora dense pubescentia, indumento pallide ferrugineo; maturescentia ut videtur 10-20, statu vivente glauco-viridia pubescentia, siccitate nigrescentia atque glabrescentia, obovoidea, apice rotundata obscure submucronata, haud costata, 1 cm. longa, 6-7 mm. diametro, stipite nigrescente sparse pubescente, 1.2-1.7 cm. longo, satis rigido, sursum ad 1.5 mm. incrassato. *Tori fructiferi* fundamentum margine valde corrugato 7-8 mm. diametro; crater intus in globum elevatum 5-6 mm. diametro stipites carpelorum suffulcientem evolutus

BRITISH GUIANA. In mixed forest, Moraballi Creek, Essequibo River, October 9th, 1929, *Sandwith* 406 (type). A tall tree with very black bark and yellow wood. Sepals green. Petals glaucous-green. Stamens cream. Styles green. Fruit downy, glaucous-green. Vernacular name (Arawak), Black Kuyama.

The species of this genus seem more difficult to define than those of any others which have come under notice in studying the Guiana material of the family; and they will have to be collected more frequently at all stages of their development before they can be properly understood. It is unfortunate that the specimens of *G. Ouregou* Dun. and *G. podocarpa* DC. at the British Museum bear no flowers; on leaf material alone these two species, as well as *G. chrysopetala* Miq., should certainly be treated as conspecific, and there is obviously great variability in the size and number of the carpels, and in the length and thickness of their stipes. The species described here is certainly not identifiable with *G. Ouregou* and its allies.

***G. scandens*** Ducke in Arch. Jard. Bot. Rio de Janeiro, iv. 10. (1925).

This bush-rope, which is widely spread over the Guianas, has for long been passing under the name *G. brevipes* DC., owing to a

mistake of Sagot who identified his no. 11 from the description, *vide sched.* and Ann. Sci. Nat. sér. vi. xi. 139 (1881). *G. brevipes* is one of several species of Annonaceae which were described by de Candolle from material collected in French Guiana by Martin, and apparently existing only in Lambert's Herbarium which is incorporated in the Herbarium of the British Museum. The type of *G. brevipes* proves on examination to bear no resemblance whatever to the present species, having very large leaves which are shining and strongly reticulate on the upper surface. No material agreeing with it has been seen in London. Ducke's description, however, of his Pará plant agrees almost perfectly with the following Guiana specimens.

BRITISH GUIANA. Hooroabea, April, 1887, *Jenman* 3784; without locality, *Hancock*; Corentyne River, *im Thurn*; hill-top on Kabio-Killi sand, Mora-mora-bisi Creek, Corentyne River, April-May, 1918, *Hohenkerk* in Forestry Department record numbers 703, 703A; "Guiana belgica," *Alex. Anderson* (Herb. Mus. Brit.).

SURINAM. *Hostmann* 1053, 1061.

FRENCH GUIANA. Karouany, 1855, *Sagot* 11; Godebert, 1920, *Wachenheim* 71, very poor material but probably this species.

Vernacular names: Yoarno ("fire-sticks sent"), *fide im Thurn*; Karikahuh ("catching fire"), *fide Hohenkerk*. Sir Everard *im Thurn* notes that the wood is used by the Warrau Indians to produce fire by friction.

**Duguetia neglecta** *Sandwith*, sp. nov.; nulli speciei adhuc descriptae obvie affinis, bracteolis magnis ad *D. bracteosam* Mart., indumento stellato denso lutescente lanato ad *D. Pohlianam* Mart. approximans.

*Arbor* vel frutex parva, circiter ad 6 m. alta, 2-3 pollices diametro; ramuli summi annotini inferne glabrescentes rubrofusci facile decorticantes 2-3 mm. diametro, sursum velut ramuli novelli hornotini breves indumento lanato stellato densissimo lutescente vestiti; internodia 1-2.5 cm. longa. *Folia* elliptica, elliptico-lanceolata vel obovato-elliptica, apice insigne longissime saepe subcuspidatim acuminata, acumine angusto tenui vulgo 2-5 cm. longo, basi cuneata, 9-20 cm. longa, 2.5-7 cm. lata, tenuiter chartacea, utrinque nitidula, concoloria, supra costa impressa dense stellato-pilosa lutescente ceterum glabra, subtus costa praesertim dimidio inferiore pilis conspicuis stellatis lutescentibus furfuraceis facile deterribilibus atque ita laxe adhaerentibus induta ut saepe glabrescere videatur, facie nonnunquam etiam sparse minute stellato-pilosula, utrinque praesertim subtus satis reticulata, nervis primariis utroque latere costae usque ad acuminis basim 10-14 circiter 7-12 mm. a margine in nervum communem lateralem valde arcuantem anastomosantibus; petiolus ut ramuli pilis stellatis dense lutescenti-lanatus, 2-5 mm. longus, ad 2.5 mm. crassus. *Inflorescentia* paullo infra-axillaris, ut videtur uniflora; pedunculus 1-2 cm. longus, 2-3 mm. diametro, indumento



ramulorum densissimo lutescente praeditus, sub flore ipso dilatatus; bracteolae binae approximatae circiter in medio pedunculo positae, insigne foliaceae, ovatae, plus minusve longe acuminatae, inaequales, majores 3.5-6 cm. longae, ad 1.7 cm. latae, minores ad 1.4 cm. longae, 6-7 mm. latae, ambae venatione ac indumento foliorum stellato deterrenti praeditae. *Alabastra* trigono-ovoidea, 1.5 cm. longa, 1 cm. diametro, dense lanato-tomentosa. *Sepala* a basi libera magna, petala aequantia vel superantia, ovato-oblonga, subacuta, 2.2-2.5 cm. longa, 1.2-1.4 cm. lata, rigide coriacea, sordide flavo-cinerea, extra densissime pilis stellatis lanato-tomentosa, intus multo minus vestita atque sub indumento purpurascencia. *Petala* subaequalia, albo-flava; exteriora obovato-oblonga, 2.2 cm. longa, 1 cm. lata, siccitate dense cinereo-tomentella, basi intus glabra purpurascence excepta; interiora obovato-lanceolata, ad 2 cm. longa, ad 0.8 cm. lata, extra ac intus dimidio superiore dense cinereo-tomentella, intus dimidio inferiore fulvo-purpurascencia striata glabrescentia; omnia siccitate extra per medium densius lanata albo-lineata, subcarinata. *Torus* 7 mm. diametro, apice in craterem circularem pistilla subtendentem excavatus. *Stamina* 2.5 mm. longa, apice tori in margine crateris inserta, filamentis brevissimis; pars connectivi producta antherae subaequilata, globoso-ovoidea, conspicue insigne acuminata, fere ad 1 mm. longa, sub lente minutissime pilosula. *Pistilla* in unico flore dissecto circiter 45, glutinosa, in tori cratere posita, circiter 1 cm. longa; ovarium pilosum, 4 mm. longum; stylus glaber, ad 6 mm. longus, apice dilatatus. *Fructus* globosus, 3-4 cm. diametro; carpella sessilia, forma generis typica, matura ad 1.5 cm. longa, striato-angulata, parte inferiore brunnea glabra, vertice rotundato convexo glabro sed siccitate pruinoso circiter 1 cm. diametro, in centro umbilicato subito breviter ad 2 mm. rostrato; semina obovoidea, testa castanea nitente, 9 mm. longa, apice ad 7 mm. diametro.

BRITISH GUIANA. Abundant by the Moraballi Creek, Essequibo River, August 20th, 1929, *Sandwith* 72 (type); Cuyuni River, June 16th, 1907, *F. C. Foote*; near Anandabaru, Kopinang River, 600 m., April, 1926, *Altson* 463; Demerary, 1791, *Alex. Anderson* (Herb. Mus. Brit.).

Vernacular name (Arawak), Yarri-Yarri or Red or Fine-leaved Yarri-Yarri. A small tree, abundant in the lowest storey of the forest. It is used by the Arawaks for poles and fishing-rods.

**Duguetia pycnastera** *Sandwith*, sp. nov.; *D. neglectae* supra descriptae manifeste affinis, foliis pro rata majoribus atque latioribus magis obovatis, indumento stellato laxo deterrenti subtus haud in costa tantum sed passim distributo, floribus bracteolisque minoribus, characteribus florum compluribus, carpellis minoribus vertice cinereo-tomentellis optime differt.

*Arbor* vel frutex parva, circiter ad 6 m. alta, 2-3 pollices diametro. *Ramuli* ut in *D. neglecta*, indumento insigni huius speciei etiam densiore et partibus annotinis diutius persistente. *Folia* obovata

vel obovato-elliptica, apice satis abrupte cuspidato-acuminata, acumine tenui 1-3 cm. longo plerumque pro rata quam in *D. neglecta* brevior, basi cuneata vel obliqua uno latere rotundato, 6.5-30 cm. longa, 3-12.5 cm. lata, tenuiter chartacea, utrinque nitidula, concoloria, indumento supra ut in *D. neglecta*, subtus pilis stellatis supra descriptis juventute saltem haud tantum secus costam densissime stipatis sed etiam secus nervos venulasque passim sparsis, aliis minoribus hic illic commixtis, reticulatione omnino ut in *D. neglecta*, sed nervis primariis foliorum aequalis magnitudinis ad marginem propius (saepius 4-8 mm. a margine) anastomosantibus. *Inflorescentia* paullo infra-axillaris, ut videtur uniflora; pedunculus ad 2 cm. longus, ad 2 mm. diametro, indumento ramulorum densissimo lutescente praeditus; bracteolae binae, ut videtur saepius longe sejunctae, foliaceae, lanceolatae, majores in medio pedunculo vel supra positae, 0.8-3 cm. longae, 1-6 mm. latae, indumento foliorum praeditae, minores infra medium pedunculum vel prope basim positae, ad 5 mm. longae, 1 mm. latae, dense lanatae. *Alabastra* ovoideo-subglobosa, ad 1.2 cm. longa, 1 cm. diametro, satis dense lanato-tomentosa. *Sepala* a basi libera, petala subaequantia vel superantia, ovato-oblonga, subacuta, 1.6 cm. longa, 8-9 mm. lata, tenuiter coriacea, extra indumento pedunculi stellato-tomentosa, subcarinata vel trinervia, intus indumento cinereo multo minutiore induta. *Petala* statu vivente sordide albo-flavida, subaequalia; exteriora majora ovato-oblonga, versus basim subito contracta, extra minute cinereo-tomentella margine rubro-brunneo glabrescente, intus glabrescentia rubro-brunnea sparse stellata, 1.7 cm. longa, ad 1 cm. lata; interiora obovato-lanceolata, infra medium contracta, indumento simili, ad 1.5 cm. longa, ad 6.5 mm. lata; omnia siccitate extra per medium densius lanata, albo-lineata vel subcarinata. *Torus* 4-5 mm. diametro, apice ut in *D. neglecta* crateriformis, margine ac in cratere ipso insigne stellato-pilosus. *Stamina* minuta ad 1.2 mm. longa, apice tori in margine crateris inserta, filamentis brevissimis; pars connectivi producta anthera latior, convexa umbonata haud acuminata, 0.75 mm. lata, sub lente minutissime pilosula. *Pistilla* in unico flore dissecto 11, glutinosa, in tori cratere posita, 4-5 mm. longa, per totam longitudinem pilosa, apice styli clavato-dilatata. *Fructus* globosus, ut videtur ad 2 cm. diametro; carpella pauca, ut videtur 10-18, obovoideo-prismatica, matura ad 1 cm. longa, striato-angulata, parte inferiore angulis exceptis sub vertice tomentellis brunnea glabra, vertice rotundato convexo insigne dense cinereo-tomentello, 7-8 mm. diametro, in centro subito breviter rostrato; semina obovoidea, testa castanea nitente, ad 6 mm. longa, apice 3-4 mm. diametro.

BRITISH GUIANA. On hill-slope on white sand, Kamwatta Creek, Koirimap River, Pomeroon River, June 25th, 1918, *Hohenkerk* in Forestry Department record number 36A (type); Moraballi Creek, Essequibo River, 1929, *Sandwith* 707; Demerary, 1791, *Alex. Anderson* (Herb. Mus. Brit.).



Vernacular name (Arawak), Yarri-Yarri or Large-leaved Yarri-Yarri. "Flowers dark cream to old ivory colour. Fruit old ivory to brown colour," *Hohenkerk*.

This species grew plentifully with *D. neglecta* by the Moraballi Creek, and the foliage (though larger) and indumentum are so similar to those of *D. neglecta* that the two were dismissed in the field as forms of one species. Fortunately, however, material of both was collected, and on return to Kew they were found to present numerous remarkable distinguishing characters in the flower and fruit, as well as less definite but apparently uniform characters in the leaves and bracteoles. The Arawaks who accompanied the expedition distinguished the two with their usual acumen.

**Duguetia Yeshidan** *Sandwith*, sp. nov.; *D. calycinae* R. Benoist affinis, sepalis brevioribus, praesertim carpellis maturis apice nunquam applanatis sed semper conico-pyramidalis striatis sensim in rostrum attenuatis differt.

*Arbor* parva, forsitan potius frutex, ad 6 m. attingens, saepe humilior, 2-3 pollices tantum diametro; ramuli 1.5-5 mm. diametro, teretes, cortice inconspicue sed crebre levissime corrugato, haud sulcato, inferne glabrescentes cinerei ad brunnei, prope apicem fulvi plus minusve dense lepidoti. *Folia* elliptica, elliptico-lanceolata vel obovato-oblonga, apice sensim vel satis abrupte longe conspicue anguste acuminata, acumine 1-3 cm. longo, basi attenuata cuneata vel obliqua uno latere rotundata, magnitudine valde variabili, adulta 15-30 cm. longa, 4.5-11 cm. lata, tenuiter chartacea, utrinque nitida, concoloria, utrinque fere aequaliter sed subtus magis prominenter fortiter intricate reticulata, nervis primariis arcuatis vel saltem adscendentibus utroque costae latere vulgo 16-20, circiter 5-12 mm. a margine in nervum communem arcuantem lateralem anastomosantibus, supra glabra, subtus sparse praesertim costa (foliis nondum evolutis membranaceis multo magis conspicue) sordide albo-lepidota, lepidibus plus minusve fimbriato-laceratis; petiolus brevis crassus, supra profunde canaliculatus, nigrescens, corrugatus, satis dense lepidotus, 1-4 mm. longus, 2-3 mm. diametro. *Inflorescentia* supra-axillaris, 1-2-flora; pedicelli 5-8 mm. longi, 2-4 mm. crassi, sursum dilatati, dense pilis albo-cinereis minutissimis stellatis atque lepidibus majoribus albo-fulvis superpositis obtecti; bracteolae basi pedicelli concavae, forma variabili, triangulari-ovatae vel rotundatae, 2-4 mm. longae, ad 4 mm. latae, extra indumento pedicellorum indutae, intus nigrescentes glabrae. *Sepala* late triangulari-ovata, 7-9 mm. longa, 10-12 mm. lata, extra indumento pedicelli stellato atque lepidoto, intus prope marginem grisea stellato-tomentella ceterum purpurascens glabra. *Petala* ovata vel late ovato-elliptica, obtusa, exteriora 2.5 cm. longa, 1.5 cm. lata, interiora paulo latiora, 2.5 cm. longa, 1.7 cm. lata, omnia statu vivente sordide albo-flava, siccitate cinerea, densissime stellato-tomentella, haud lepidota, prope basim, praesertim exteriorum intus, glabra. *Torus* circiter 8 mm. diametro. *Stamina*

claviformia, filamentis brevissimis, circiter 2.2 mm. longa, parte connectivi producta loculis latiore minutissime pilosula ad 1 mm. lata. *Pistilla* 3-4 mm. longa, sub lente satis obscure furfuraceo-pubescentia. *Carpella* matura numerosissima in caput globosum muricatum brunneum 3-5 cm. diametro aggregata, parte inferiore glabra brunnea angulato-striata 8-13 mm. longa, 5-11 mm. lata, vertice cinereo-tomentello conico-pyramidato striato in rostrum saepius arcuatum vel subfalcatum attenuato, rostro incluso 5-7 mm. longo, 7-13 mm. diametro; semina obovoidea, 1 cm. longa, 6-7 mm. diametro, testa alba vel stramineo-brunnea nitida.

BRITISH GUIANA. In mixed forest, Moraballi Creek, Essequibo River, August 16th, 1929, *Sandwith* 22 (type); *ibid.*, in morabukea forest, August 13th, *Sandwith* 1; *ibid.*, in mora swamp-forest, Sept. 12th, *Sandwith* 246; Bartica, April 1887, *Jenman* 3602; Cuyounie (Cuyuni?) Creek, *Appun* 387; Kamwatta Creek, Koirimap River, Pomeroun River, June 1918, *Hohenkerk* in Forestry Department record no. 702.

Vernacular name (Arawak), Yeshidan. Creole Name, Armadillo Tree.

Evidently one of the commonest small trees of the lowest storey of the forest.

**D. inconspicua** *Sagot* in Ann. Sci. Nat. sér. vi. xi. 135 (1881).

Moraballi Creek, Essequibo River, August 30th, 1929, coll. O. W. Richards in *Sandwith* 156. Shrub or low tree, about 7 feet high, only once found in mora swamp. Flowers creamy white, amongst the leaves, with a very narrow, lanceolate, acute facies. Larger petals much longer than the shorter whorl.

*Distr.* British Guiana, French Guiana (*Sagot* 1096!).

This species belongs to a distinct group of plants with dark, rugose, loosely stellate-hairy uppermost branchlets; leaves very sparsely stellate-hairy, not lepidote, beneath; both sepals and petals stellate-tomentose only, not lepidote; and decidedly narrow flowers. Other members of this group are *D. amplexifolia* R. E. Fries from Surinam, and *D. rostrata* Rusby and *D. pauciflora* Rusby from the mouth of the Orinoco in Venezuela. Unfortunately all these species are represented by a single collection, and the validity of the characters distinguishing some of them is therefore rather uncertain. *Jenman* 4071, collected on the Upper Demerara River in 1887, may be referred provisionally to *D. inconspicua*.

“**D. ? glabra**” *Britton* in Bull. Torrey Bot. Club, xvi. 14 (1889).

For the benefit of future workers on this genus, it may be pointed out that the Bolivian syntype (*Rusby* 1378) of this species in Herb. Kew. belongs to the Moraceae and should be referred to *Pseudolmedia* or some closely allied genus.

**Unonopsis glaucopetala** R. E. Fries in Bull. Herb. Boiss. Sér. ii. vii. 1004 (1907).



Moraballi Creek, Essequibo River, September 28th, 1929, *Sandwith* 355. Middle-sized tree, 64 feet high, in greenheart-wallaba forest. Flower green in bud; petals biscuit-coloured. *Ibid.*, October 10th, 1929, *Sandwith* 411. Middle-sized tree, 75½ feet high, 8 in. diam., in mixed forest. Fruit green.

Vernacular names (Arawak): Arara; Black Hill Yarri-Yarri.

*Distr.* Endemic. Other collections recently identified as this very distinct species are *C. W. Anderson* 389, Issororo, North-west District, August 1909; *Hohenkerk* in Forestry Department record no. 735, Kamwatta Creek, Koirimap River, Pomeroon River, July 1918.

Fries' specific name is relevant to the dried material.

**Anaxagorea dolichocarpa** *Sprague et Sandwith*, sp. nov.; *A. acuminatae* (Dun.) St. Hil. affinis, foliis magnitudinem multo majorem attingentibus, floribus maturis majoribus, praesertim carpellis maturis multo longius stipitatis differt.

*Arbor* parva, 4·5–9 m. alta; ramuli summi novelli indumento furfuraceo ferrugineo primo induti, mox ut seniores glabrescentes. *Folia* elliptica, oblonga, obovato-elliptica vel lanceolata, apice sensim vel fere cuspidatim acuminata acumine 0·5–4 cm. longo, basi acute vel obtuse cuneata nonnunquam fere rotundata, magnitudine in eodem exemplo valde variabili, 12–42 cm. longa, 3–12 cm. lata, chartacea, utrinque subopaca sed sub lente passim dense pellucide punctata, supra glabra, subtus sub lente minute ferrugineo-lepidota, nervis primariis costaque subtus prominentibus, rete venularum haud prominulo, nervis primariis in utroque latere costae vulgo 12–16 a sese 1–4 cm. distantibus, laete arcuantibus; petiolus 6–15 mm. longus, ad 3 mm. crassus, supra canaliculatus, ferrugineo-pubescent vel nigrescent glaber. *Inflorescentiae* supra-axillares, semper in ramulis vetustis lignosis positae, 1–2-florae; pedicelli ferrugineo-tomentosi, 5–6 mm. longi, sursum incrassati; bracteolae varie positae, ovatae, concavae, ferrugineo-tomentosae, ad 2·5 mm. longae atque latae. *Flores* maturi inaperti ovoideo-subglobosi, saepe subacuminati, 0·9–1·3 cm. longi, 1–1·3 cm. diametro, ferrugineo-tomentosi. *Sepala* vetustate patula vel reflexa, triangulari-ovata, extra ferrugineo-tomentosa, intus glabra, 7–8 mm. longa, 6–7 mm. lata. *Petala* extra ferrugineo-tomentosa, intus glabrescentia, ovato-lanceolata, subaequalia, matura 1·3–1·5 cm. longa, 6–7 mm. lata, glandulosa odorifera, saepe (praesertim interiora dimidio superiore) valde indurata coriacea. *Torus* convexus, 5–6 mm. diametro. *Stamina* lineari-clavata, 4–5 mm. longa, filamentis ad 1·2 mm. longis; pars connectivi apice producta anthera latior, rotundata vel quadrata, circiter 1 mm. lata; stamina interiora sterilia. *Pistilla* in globo denso 5 mm. longo atque diametro arcte conferta. *Fructus* carpellis circiter 8–12; carpella juniora furfuracea, ferrugineo-tomentosa; matura siccitate pullata glabrescentia, tempore dehiscentiae longe stipitata clavata, stipite incluso 3·5–4·5 cm. longa, parte seminifera 8–10 mm. diametro apice dorsali brevissime

rostrata; semina bina, castanea vel nigrescentia, nitidissima, ellipsoidea, 1.4–1.7 cm. longa, 6.5–9 mm. lata.

BRITISH GUIANA. Bartica, November 1888, *Jenman* 5089 (type); *ibid.*, November 1886, *Jenman* 2511; Moraballi Creek, Essequibo River, in morabukea forest, mixed forest and 'low bush,' August–October, 1929, *Sandwith* 6, 172, 340, 410; Pomeroon River, *Hancock*; Kamwatta Creek, Koirimap River, Pomeroon River, August 14th, 1918, *Hohenkerk* in Forestry Department record no. 35B; Mamura Hill, Aruka River, North-west District, July 1908, *C. W. Anderson* 35; Gravel Creek, Kaituma River, North-west District, October 1908, *C. W. Anderson* 35A; forest in Caribouparu Valley, south of Mt. Kowatipu, Ireng District, April 1926, *Altson* 500.

Vernacular names: Kurihikoyoko (Arawak); Swamp or Black Yarri-Yarri (Arawak), but verification of these is required as they may also be applied to other *Annonaceae*; Murnek-Yek (Patamona), *vide* Altson.

**Cymbopetalum brasiliense** (Vell.) Benth. in Journ. Linn. Soc. v. 69 (1861). *Uvaria brasiliensis* Vell. Fl. Flum. 238 (1825) and v.t. 122 (1827); Mart., Fl. Bras. vol. xiii. pars. i. 39 (1841).

Moraballi Creek, Essequibo River, September 26th, 1929, *Sandwith* 343. Low tree about 10 ft. high, on slope in morabukea forest, only once found. Carpels crimson; seeds black, with orange aril.

*Distr.* Trinidad, Guiana, Brazil.

**Rollinia multiflora** Splitg. in Hoev. and De Vriese, Tijdschr. ix. 97 (1842).

Moraballi Creek, Essequibo River, September 19th, 1929, *Sandwith* 301. Middle-sized tree, 60–80 ft. high, in 'low bush.' Leaves glaucous beneath. Buds greenish-brown. Fruit glaucous.

Vernacular name (Arawak), Kuyechi.

*Distr.* Trinidad, British Guiana, Surinam.

**Annona haematantha** Miq. in Linnaea xxii. 465 (1849).

Moraballi Creek, Essequibo River, October 7th, 1929, *Sandwith* 392. Scrambling, not coiling, bush-rope in wallaba forest; also seen in wallaba-mora swamp-forest. Petioles and branchlets reddish-ferrugineous tomentose. Sepals brownish-tomentose. Petals in two series, the outer large and widely-spreading in flower, the inner very small, all a beautiful and striking deep pinkish-red.

Vernacular name (Arawak), Karampai.

The material agrees exactly with the type collection (*Hostmann* 1191) from Surinam, which was noted as "planta scandens flore sanguineo, in sylvis uliginosis." This beautiful species, remarkable both for its habit and for the colour and shape of its open flowers, appears to be allied to *A. acutiflora* Mart. with which Pulle has identified it in his Flora of Surinam; but Martius' species evidently differs specifically in the size of its leaves and the colour of its flowers, as well as in its habit, which is not scandent, and its locality in the



neighbourhood of Rio de Janeiro. No further material of *A. haematantha* has been seen, and it does not appear to have been collected previously in British Guiana.

*Distr.* British Guiana, Surinam.

***Annona symphyocarpa*** *Sandwith*, sp. nov.; *A. glabrae* L. (*A. palustri* L.) affinis, foliis longius acuminatis, subtus glaucis pilis minimis adpressis satis raris regulariter conspersis, floribus multo minoribus differt.

*Arbor* mediocris ad 24 m. alta; ramuli summi glabri, siccitate fulvi vel purpurascens, corrugato-sulcati, 2-3 mm. diametro. *Folia* ovata, elliptica vel lanceolata, apice sensim in acumen conspicuum angustum tenue ad 2 cm. longum attenuata, basi rotundata vel exemplis angustioribus obtuse cuneata, 5-18 cm. longa, 2.5-7 cm. lata, satis tenuiter chartacea, supra glabra nitida viridia fortissime ut in *A. glabra* reticulata nervis primariis arcuatis utroque latere costae vulgo 10-15, subtus glauca pilis minimis adpressis satis raris passim regulariter conspersa costa nervisque primariis prominentibus reticulatione immersa satis obscura; petiolus siccitate nigrescens, rugulosus, glaber vel minutissime pilosulus, 0.6-1.8 cm. (vulgo 1-1.5 cm.) longus, 1-2 mm. diametro. *Inflorescentia* infra-axillaris, 1-4-flora; pedicelli 0.7-1.2 cm. longi, rufo-pilosuli, sub fructu juniore ad 2.2 cm. longi atque glabrescentes; bracteolae in medio pedicello parvae, ovatae, pilosulae. *Flores* glandulis obiecti, perodori; alabastra globoso-pyramidata, acuminata, siccitate ad 6 mm. diametro. *Calyx* sinuato-patelliformis obscure vel vix trilobatus, 6-7 mm. diametro, obscure rufo-pilosulus. *Petala* extra adpresse pilosula; 3 exteriora triangulari-cordata, 7 mm. longa atque lata; 3 interiora valvata, ovata, 5 mm. longa, 3.5-4.5 mm. lata. *Torus* circiter 2.2 mm. diametro. *Stamina* 1-1.2 mm. longa, filamentis glabris circiter 0.3 mm. longis, apice connectivi glabro anthera angustiore. *Carpella* ut in *A. glabra* in globum circiter 2 mm. altum 2.5 mm. diametro dense concreta. *Fructus* jam valde immaturus globosus, glaucus, 8-11 mm. diametro, siccitate dense rugulosus; maturus (dissecta fragmenta tantum visa) ut videtur circiter 4 cm. diametro, sublaevis, obscure areolatus.

BRITISH GUIANA. Swampy bank on sandy soil, Pokorero Creek, Kamuni River, Demerara River, April 20th, 1923, *Hohenkerk* in Forestry Department record no. 872 (type). Height 78 ft., with girth 43 in. at 4½ ft. Demerary, 1791, *Alex. Anderson* (Herb. Mus. Brit.); this sheet was recognised as a new species by Safford, who proposed to name it after the collector. In mixed forest, Moraballi Creek, Essequibo River, September 19th, 1929, *Sandwith* 298. Low tree about 40 ft. high, with young glaucous fruits.

The Arawak vernacular for this tree is Doro or Duru, which is also more commonly applied to *Apeiba Petoumo* Aubl.

***Xylopia pulcherrima*** *Sandwith*, sp. nov.; *X. sericeae* St. Hil. affinis, foliis anguste elliptico-oblongis apice cuspidato-acuminatis,

subtus pulchrius sericeis atque pernitentibus, nervis primariis multo magis rectis parallelisque e costa angulo obtusiore excurrentibus, petalis angustioribus, indumento stylorum conspicuo differt.

*Arbor* silvis densis crescens, circiter 27 m. alta, cortice rubro-brunneo, qua de causa nomen "Red Kuyama" ab incolis datur; ramuli summi teretes, pulli, lenticellati, densissime ferrugineo-tomentosi; internodia 5–15 mm. longa. *Folia* anguste elliptico-oblonga, apice cuspidato-acuminata acumine 3–6 mm. longo, basi rotundata, 4–9 cm. longa, 1.5–2.5 cm. lata, supra glabra olivacea subnitida, subtus pilis arctis adpressis pulcherrime cinereo-argentea sericea pernitentia, praeterea marginibus ipsis conspicue prorsus pilosa, costa supra profunde impressa subtus prominente, reticulatione utrinque obscure prominula, nervis primariis angulo obtuso 100°–120° e costa excurrentibus usque ad furcam rectis fere parallelis; petiolus ferrugineo-tomentosus, supra canaliculatus, 3–5 mm. longus. *Inflorescentia* pauciflora, ut videtur 2–4-flora, omnino sericeo-tomentella, siccitate pallide ferruginea; pedicelli breves, 2–3 mm. longi; alabastra basi globosa, tum cylindrica, obtusa, planta vivente viridi-flava sericea nitentia; bracteolae in medio vel supra medium pedicellum, ovatae, obtusae, ad 1.25 mm. longae, extra sericeae, intus glabrae. *Sepala* inferne connata, triangulari-ovata, 2 mm. longa, 2.5 mm. lata, extra ferrugineo-sericea, intus glabra. *Petala* pulcherrima, flore aperto patulo-stellata, candidissima, exteriora nonnunquam triente inferiore secus medium colore roseo suffusa, omnia utrinque dense tomentella, extra sericea, basi connata, exteriora ad 1.5 cm. longa, ad 2.2 mm. lata, interiora basi dilatata paullo breviora circiter 1 mm. lata. *Stamina* 0.8 mm. longa. *Carpella* 8–10; ovarium pilosum, circuitum 1 mm. altum; stylus 4–5 mm. longus, dimidio superiore dense conspicue retrorse pilosus, inferiore glaber. *Fructus* non visus.

BRITISH GUIANA. In mixed forest, Moraballi Creek, Essequibo River, October 15th, 1929, *Sandwith* 456 (type). Middle-sized tree up to about 90 ft., with small flange buttresses. Bark reddish-brown. Branches ferrugineous-hairy. Leaves greyish-silvery sericeous beneath. Sepals brownish-sericeous. Buds greenish-yellow sericeous. Petals very beautiful, pure white, opening freely, the outer sometimes with a central longitudinal flush of pink in the lower third. Vernacular name (Arawak), Red Kuyama.

The styles of *X. sericea* are glabrous. The leaves of the present species resemble in shape those of *X. nitida* Dun. of French Guiana rather than those of *X. sericea*, which was collected in British Guiana by Schomburgk.

***Xylopia cinerea*** *Sandwith*, sp. nov.; *X. nitidae* Dun. affinis, ramulis novellis sericeis, foliis supra subopacis subtus conspicue sericeis nitentibus, floribus longius pedicellatis, calyce bracteolisque glabris differt.

*Arbor* excelsa, 37.5 m. alta, 16 poll. diametro, in silvis densis crescens, cortice cinereo, qua de causa nomen "White Kuyama" ab



incolis datur; ramuli summi teretes corrugati cinerei glabrati, versus apicem partis novellae tenuiter arcte adpresse cinereo-sericeae; internodia ad 15 mm. longa. *Folia* anguste elliptica, apice breviter acuminata acumine 2-4 mm. longo vel haud acuminata sed acuta vel obtusa, basi attenuata cuneata, 4-8.5 cm. longa, 1.5-2.5 cm. lata, supra glabra viridia subopaca, subtus pilis arctis adpressis argenteo-sericea nitentia, costa supra impressa subtus prominente, reticulatione supra satis conspicue subtus obscurius prominente, nervis primariis angulo obtuso 120°-140° e costa excurrentibus usque ad furcam rectis vel arcuatis; petiolus indumento ramulorum adpresse pubescens, nonnunquam fere glabrescens, supra profunde canaliculatus, 3-5 mm. longus. *Inflorescentiae* infra folia in ramulis annotinis dispositae, pauciflorae, pedicellis vetustate saltem fere glabratis corrugatis cinereis 5-10 mm. longis; bracteolae pedicellos amplectentes, siccitate nigrae, glabrae, circiter 1 mm. longae, 3-4 mm. latae. *Flores* non visae. *Calyx* post florum lapsum 2 mm. longus, 4-5 mm. diametro, cupularis, siccitate niger, glaber, circiter ad medium (juventute verisimiliter minus profunde) trilobatus, lobis latis rotundatis semicircularibus. *Torus* glaber 5-6 mm. diametro. *Monocarpia* (immatura) 15-25, clavata vel acinaciformia, fructu in stipitem circiter 5 mm. longum sensim transeunte, plerumque falcata, planta vivente viridia, siccitate nigra, juventute pubescentia, denique glabrata, 1-2.5 cm. longa, versus apicem 2-2.5 mm. diametro. *Semina* immatura 4-5, brunnea, ellipsoidea, 2-3 mm. longa, 1-2 mm. lata, arillo ad 0.8 mm. alto praedita.

BRITISH GUIANA. In mixed forest, Moraballi Creek, Essequibo River, Nov. 1st. 1929, *Sandwith* 543 (type). Tall tree, 125 ft. high, 16 in. diameter. Leaves green above, silvery-sericeous beneath. Fruit green.

Vernacular name (Arawak), White Kuyama.

**X. Benthami** *R. E. Fries* in Svensk. Vet. Akad. Handl. xxxiv. no. 5, 35, t.v., fig. 2-4 (1900); in Acta Hort. Berg. Band 10, no. 1, p. 112 (1930).

Moraballi Creek, Essequibo River, September 28th, 1929, *Sandwith* 353. Small tree, 45 ft. high, 5 in. diam., in wallaba forest on sandy ridge, of which it is a characteristic constituent. Cauli-florous; buds green; open flowers starlike, cream. Carpels in huge round bunches, green, turning crimson. Leaves glaucous beneath.

Vernacular name (Arawak), Weshiraure.

*Distr.* British Guiana, Brazil (Rio Negro), Venezuela (Rio Casiquiare). Not recorded from British Guiana by Fries in his recently published monograph of the genus, but it had already been collected on the Moblissa River, Demerara County, in February 1910, by C. W. Anderson in Forestry Department record no. 555; and on the Mora-mora-bisi Creek, Mapenna River, Corentyne River, in May 1918, by L. S. Hohenkerk in Forestry Department record no. 555A.

# INDEX OF VERNACULAR NAMES.

Arara	Unonopsis glaucopetala R. E. Fries
Armadillo Tree	Duguetia Yeshidan sp. nov.
Doro or Duru	Annona symphyocarpa sp. nov.
Karampai	Annona haematantha Miq.
Karikahuh	Guatteria scandens Ducke
Kurihikoyoko	Anaxagorea dolichocarpa sp. nov.
Kuyama, Black	Guatteria atra sp. nov.
„ Red	Xylopia pulcherrima sp. nov.
„ White	Xylopia cinerea sp. nov.
Kuyeche	Rollinia multiflora Splitg.
Murnek-Yek	Anaxagorea dolichocarpa sp. nov.
Weshiraure	Xylopia Benthami R. E. Fries
Yarri-Yarri, Black	Anaxagorea dolichocarpa sp. nov.
„ Black Hill	Unonopsis glaucopetala R. E. Fries
„ Fine-leaved	Duguetia neglecta sp. nov.
„ Large-leaved	Duguetia pycnastera sp. nov.
„ Red	Duguetia neglecta sp. nov.
„ Swamp	Anaxagorea dolichocarpa sp. nov.
Yeshidan	Duguetia Yeshidan sp. nov.
Yoarno	Guatteria scandens Ducke

## LII.—ON THE FLORA OF THE NEARER EAST: IX.\*

A CONTRIBUTION TO OUR KNOWLEDGE OF THE FLORA OF AZERBAIDJAN, N. PERSIA. B. GILLIAT-SMITH AND W. B. TURRILL: IV.

### CHENOPODIACEAE (continued).

**Halocnemum strobilaceum** *M. Bieb.* Flor. Taur.-Cauc. iii. 3 (1819)

Hills north of Tabriz, 10.29, No. 2653.

*Distrib.* Medit. Region and Cent. Asia.

**Kochia lanata** *Rechinger* ex Bornm. in Verh. Zool.-Bot. Ges. Wien lx. 167 (1910). *K. prostrata* var. *canescens* Moq.

Hills south of Tabriz, 19.6.28, No. 2307.

*Distrib.* Orient.

**Noaea spinosissima** *Moq.* in DC. Prodr. xiii. ii. 209 (1849).

Near Tabriz, 9.27 (flower and fruit), No. 2140; (in fruit) No. 2172. Fruit every shade of pink and red.

*Distrib.* Medit. Region.

**Petrosimonia glauca** *Bunge* Anab. Rev. 52, 58 (1862).

Tabriz, weed in garden, 24.8.27, Nos. 2136, 2137. Flowers red, minute, from June to August and is in fruit Sept. to Oct.

*Distrib.* N. Persia and shores of the Caspian Sea.

**Salsola brachiata** *Pall.* Illustr. 30, t. 22 (1803).

Near Tabriz, 11.25, No. 1315.

*Distrib.* S. Russia, Caucasus, N. Persia, Afghanistan, Cent. Asia.

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\*Continued from *K.B.* 1930, p. 463.



**S. glauca** M. Bieb. Flor. Taur.-Cauc. i. 185 (1808).

Near Tabriz, 17.7.27, No. 1989; 7.27, No. 2161; north-east of Tabriz, among the ruins of an old fort called the Rashdiyeh Fort, 8.27, No. 2178.

*Distrib.* Armenia, Caucasus, N. Persia.

**S. Kali** L. Sp. Pl. 222 (1753).

Hills south of Tabriz, 8.27, No. 2132; Tabriz, weed in garden, 6.27, Nos. 2138, 2139; hills south of Tabriz, 7.27, Nos. 2141, 2142. Flowers from summer to early autumn.

*Distrib.* N. Temp. Region.

This species is known to be very polymorphic and to vary greatly with age and I have not attempted to apply varietal names.

**S. spissa** M. Bieb. in Mem. Soc. Mosc. i. 103 (1811).

Tabriz, weed in garden, 24.8.27, flowers minute, red, Nos. 2135, 2157; 28.10.27, No. 2179; cultivated at Kew from Tabriz seeds as K.682, 3.10.28, 26.11.28.

*Distrib.* S. Russia, Asia Minor, Armenia, Persia, Afghanistan, Cent. Asia.

**Salsola** sp. nov. ? aff. *S. glaucae* M. Bieb.

Near Tabriz, 11.25, No. 1312.

The material is unfortunately too imperfect for a complete description to be prepared.

**Seidlitzia florida** Bunge ex Boiss. Flor. Or. iv. 950 (1879).

Near Tabriz, 11.25, No. 1316 (?); north-east of Tabriz, near the ruins of Rashdiyeh Fort, 10.27, No. 2177 (?); east of Tabriz, 29.10.27 (fruit), No. 2181. Fruit various shades of pink, red, or orange.

*Distrib.* Armenia, Persia.

The nature of the material makes the identification of the first two numbers somewhat doubtful.

**Spinacia tetrandra** Stev. ex M. Bieb. Flor. Taur.-Cauc. ii. 417 (1808).

Tabriz, garden weed, 4.26, No. 1384; 4.26, No. 1425.

*Distrib.* Caucasus, Armenia, Turkestan, Iraq, N. Persia, Afghanistan, Caspian districts.

**Suaeda altissima** Pall. Illustr. Pl. 49 t. 42 (1803).

Near Tabriz, 5.26, No. 1515; 6.26, No. 1665; 13.6.27, No. 2156.

*Distrib.* Medit. Region, S.E. Eur., Cent. Asia.

#### POLYGONACEAE.

**Atraphaxis spinosa** L. Sp. Pl. 333 (1753), var. **glauca** Boiss. Flor. Or. iv. 1021 (1879).

Hills to the north of Tabriz, flowers June, fruits July 1928, No. 2382; Shor Dara (Dere), Yam, 7.28, No. 2478. Fruits various shades of pink and red.

*Distrib.* (of species) Crimea, Caucasus, east to Afghanistan and Cent. Asia, and south to the eastern Egyptian desert.

(of var.) Armenia, N. Persia, Afghanistan.

**Polygonum ammannioides** *Jaub. et Spach* Ill. Plant. Or. ii. 28, t. 119 (1844-46).

Near Tabriz, 8.9.29, Nos. 2617, 2618; Yam, 7.28, No. 2380.

*Distrib.* Azerbaidjan.

**P. aviculare** *L.* Sp. Pl. 362 (1753) s.l.

Tabriz, in garden, 6.27, No. 2147; 6-7.28, No. 2381; east of Tabriz, 29.10.27, No. 2180; in Consulate garden, Tabriz, 10.29, Nos. 2650, 2651.

*Distrib.* Cosmopolitan.

**P. Bellardii** *All.* Flor. Pedem. ii. 207, t. 90. f. 2 (1785).

Tabriz, garden weed, 9.25, No. 1304; 5.26, No. 1614; 5.26, No. 1671; 5.27, Nos. 2066, 2067, 2146; in Consulate garden, Tabriz, 10.29, No. 2652. Flowers white or pink, through the spring, summer, and autumn.

*Distrib.* Medit. Region and Cent. Asia.

**P. luzuloides** *Jaub. et Spach* Illustr. Plant. Or. ii. 37, t. 126 (1844-46).

Yam, 7.8.28, No. 2022.

*Distrib.* N. Asia Minor, Armenia, N. and W. Persia.

**P. paronychioides** *C. A. Mey.* in Bull. Soc. Nat. Mosc. 1838, 356.

Hills south of Tabriz, 6.27, flowers pink or red, No. 2134; 6.28, No. 2268.

*Distrib.* N. Persia.

**P. polycnemoides** *Jaub. et Spach* Illustr. Plant. Or. ii. 30, t. 120 (1844-46).

Plain under Mishou Dagh, 9.29, No. 2605.

*Distrib.* E. Asia Minor, Syria, Iraq, Persia, Afghanistan.

**Rumex Acetosella** *L.* Sp. Pl. 338 (1753).

Mishou Dagh, 22.5.27, No. 1796.

*Distrib.* Cosmopolitan.

**R. obtusifolius** *L.* Sp. Pl. 335 (1753).

Garden weed in Tabriz, 5.26, No. 1661; 23.5.27, Nos. 2169, 2170.

*Distrib.* E.N. Temp. Region.

**R. scutatus** *L.* Sp. Pl. 337 (1753).

Mishou Dagh, 12.7.28, No. 2379.

*Distrib.* Medit. Region.

#### THYMELAEACEAE.

**Diarthron vesiculosum** *Endl.* Gen. Plant. Suppl. iv. Pars. ii. 63 (1847).



Hills north of Tabriz, 7.28, No. 2395.

*Distrib.* E. Asia Minor, Persia, Afghanistan, Baluchistan, Cent. and N. Asia, N. India, China.

**Lygia Passerina** *Fasano* in Atti. Act. Nap. 1787, 247 (1788); Boiss. Flor. Or. iv. 1052 (1879).

Yam, 2.8.28, No. 2429.

*Distrib.* Cent. Eur., Medit. Region, Cent. Asia.

#### ELAEAGNACEAE.

**Elaeagnus angustifolius** *L.* Sp. Pl. 121 (1753), var. **orientalis** *O. Kuntze* in Acta Hort. Petrop. x. 235 (1887).

Very common around Tabriz, in fruit, 8-9.25, No. 1299; fruiting in gardens where it is cultivated, fruits when ripe yellowish brown or brown, very dry and tasteless, in flower, 26.5.26, flowers yellow, sweet scented, No. 1659. Turki "ida," Persian "sindjif." Sometimes known as "Persian dates."

*Distrib.* Medit. Region, Cent. Asia, China.

#### SANTALACEAE.

**Thesium ramosum** *Hayne* in Schrad. Journ. 1800, 30, t. 7.

Village of Hassar between the lake and city of Urmia, 21.5.26, No. 1532.

*Distrib.* E.N. Temp. Region.

#### EUPHORBIACEAE.

**Chrozophora obliqua** *A. Juss.* Tent. Euph. 28 (1824), var. **genuina** *Prain* in *Kew Bull.* 1918, 112.

Plain between Tabriz and Sofia, also at Yam, 8.28, No. 2474. Flowers small, yellow.

*Distrib.* (of species and var.) Medit. Region.

**Euphorbia Chamaesyce** *L.* Sp. Pl. 455 (1753).

Hills north of Tabriz, 28.4.29, No. 2560.

*Distrib.* Medit. Region.

**E. Esula** *L.* Sp. Pl. 461 (1753).

Near Tabriz, 5.26, No. 1499 (very young); 5.27, No. 1825.

*Distrib.* E.N. Temp. Region.

**E. falcata** *L.* Sp. Pl. 456 (1753).

Near Tabriz, 17.6.27, No. 1912. Flowers in June and July.

*Distrib.* Cent. Eur. and Medit. Region.

**E. Gerardiana** *Jacq.* Flor. Austr. v. 17, t. 436 (1778).

Hills south of Tabriz, 20.4.27, Nos. 1826, 1827. One of the most abundant plants on the hills, and it colours the countryside a greenish-yellow in spring and autumn.

*Distrib.* E.N. Temp. Region.

The plants do not agree with Boissier's description in Flor. Or. iv. 1127 (1879) of *B. Hohenackeri*, nor with Hohenacker's specimen at Kew.

**E. Marschalliana** Boiss. Diagn. Ser. I. vii. 94 (1845).

Hills south of Tabriz, 11.25, No. 1317 ; 27.3.26, No. 1334 ; 4.26, No. 1372. Plants quite prostrate, but with showy yellow to ruby red heads, strong smelling when in flower.

*Distrib.* Armenia, Transcaucasus, N. Persia.

In the absence of ripe fruits I am not quite sure of the identification of these specimens.

**E. megalantha** Boiss. Diagn. Ser. I. vii. 95 (1846).

Tabriz, garden weed, 26.4.26, No. 1405 (very young) ; near Tabriz, 20.4.27, No. 1824 (fruits slightly longer than the normal).

*Distrib.* Armenia, Persia.

**E. orientalis** L. Sp. Pl. 460 (1753).

Dik Dash, Yam, 9.29, No. 2604.

*Distrib.* Armenia, Kurdistan, Persia.

**E. Szovitsii** Fisch. et Mey. Ind. Sem. Hort. Petrop. i. 27 (1835).

Valley of Livan, among rocks near the torrent, 9.25, No. 1278 ; hills to the south of Tabriz, 21-29.5.27, No. 1790 ; near Tabriz, 5.27, No. 1828.

*Distrib.* Asia Minor, Syria, Armenia, Caucasus, Persia.

**E. tinctoria** Boiss. et Huet in DC. Prodr. xv. 166 (1862).

Hills south of Tabriz, 4.26, No. 1675 (?) ; Yam, 25.7.29, No. 2579 (galled by insects with the production of long pod-like structures).

*Distrib.* Asia Minor, Armenia, Syria, Persia.

**Euphorbia** sp.

Near Tabriz, 6.27, No. 1913. Attacked by *Uromyces striolatus* Tranz. (det. E. M. Wakefield).

#### URTICACEAE.

**Parietaria judaica** L. Sp. Pl. ed. 2. 1492 (1763), sensu Boiss. Flor. Or. iv. 1149 (1879).

Near Urmia, on rocks 21.5.28, No. 2258.

*Distrib.* E. Medit. Region.

**P. persica** Stapf in Denkschr. Math.-Naturwiss. Cl. K. Akad. Wiss. li. 272 (1886).

Hills to the north of Tabriz, on rocks, 15.5.27, No. 1931 (?) ; 28.4.29, No. 2561.

*Distrib.* Persia.

**Ulmus glabra** Mill. Gard. Dict. ed. viii. (1768).

Near Tabriz, 11.25, No. 1311 ; 27.3.26, No. 1332 ; 4.26, No. 1395 ; 26.4.26, No. 1422 ; 4.26, No. 1673. Turki "Gara aghatch" i.e. black tree.

*Distrib.* Widely distributed in temperate Eurasia.



**U. montana** *With.* Bot. Arr. Brit. Pl. ed. III. ii. 279 (1796).

Near Tabriz, 27.3.26, No. 1333 ; 4.26, No. 1394. Less common than *U. glabra* Mill.

*Distrib.* Widely distributed in temperate Eurasia.

#### SALICACEAE.

**Populus alba** *L.* Sp. Pl. 1034 (1753).

Near Tabriz, 11.28, No. 1314. The tree tends to assume a pyramidal form. Its wood is used for beams in the village houses, and in Turki it is known as "Goi kalama," i.e. "blue poplar" and also as "Tabrizi."

*Distrib.* N. Temp. Region.

**P. euphratica** *Oliver* Voy. Atlas, iii. 449, f. 45-46 (1801-07) ; Boiss. Flor. Or. iv. 1197 (1879).

Near Tabriz, 4.26, No. 1373 ; 5.26, No. 1645. The bark is of an intensely shining white colour, whence the Turki name "Agh kalama," i.e. "white poplar." Also used for beams in houses.

*Distrib.* E. Medit. Region.

**Salix fragilis** *L.* Sp. Pl. 1017 (1753).

Near Tabriz, 29.4.26, No. 1445.

*Distrib.* E.N. Temp. Region.

**S. Medemii** *Boiss.* Diagn. Ser. I. vii. 100 (1846).

In gardens, Tabriz, 1.4.26 (in flower), No. 1350. Known as "bid i Mishk" i.e. "Musk willow." The male inflorescences are distilled for making an essence with which food is flavoured.

*Distrib.* Persia.

#### ORCHIDACEAE.

**Orchis iberica** *M. Bieb.* in Willd. Sp. Pl. iv. 25 (1805). *O. angustifolia* *M. Bieb.* Flor. Taur.-Cauc. ii. 368 (1808).

Yam marshes, 20.7.28, flowers pink, No. 2375 ; 20.8.28, No. 2480 (in fruit) ; under Mishou Dag, 25.7.29, No. 2575.

*Distrib.* Greece east to Persia.

**O. latifolia** *L.* Sp. Pl. 941 (1753) sensu Boiss. Flor. Or. v. 71 (1884).

Marshy field at Seivan, near Yam, 22.5.27, flowers purple, No. 1870a.

*Distrib.* E.N. Temp. Region.

#### IRIDACEAE.

**Crocus Adamii** *J. Gay* in Bull. Soc. Sci. Nat. Férussac, xxv. 319 (err. typ. 219) (1831).

Hills north of Tabriz, 2.4.26, No. 1340.

*Distrib.* Crimea (?), Caucasus, Armenia.

The two specimens on the sheet differ in the colouration of the perianth. In the dried condition one has the tepal lobes pale violet

with dark longitudinal lines which are partly continued into the tube ; the other had dark violet lobes, paler at the margins but not lined.

*C. Adamii* has been reduced to a variety of the more widely distributed *C. biflorus* Mill., as by Maw. The Genus *Crocus* 291 (1886) and by Boissier, *Flor. Or.* v. 112 (1884).

**Gladiolus atrovioleaceus** Boiss. *Diagn. Ser. I.* xiii. 14 (1853).

Urmia district, 5.26, No. 1567 ; Kara Dag, north of Tabriz, coll. Egger, spring 1927, No. 2174. It also occurs on the hills south of Tabriz.

*Distrib.* Palestine, Syria, Iraq, Armenia, N. Persia.

**Iris Barnumae** Foster et Baker in *Gard. Chron.* 1888, ii. 182.

Near Tabriz, 5.29, flowers violet purple or claret, No. 2488.

*Distrib.* Between Egypt and Palestine, Armenia, N. Persia.

**I. Barnumae** Foster et Baker, var. **urmiensis** Dykes The Genus *Iris* 115 (1913).

Mt. Sir, Urmia, and Kushtchi Gadugi Pass north of Urmia, 27.5.28, No. 2221 ; Tabriz district, 5.29, No. 2487. Whole flower pure bright yellow, with no lines on any of the petals, but the beard often darker, orange coloured. Very plentiful.

*Distrib.* (of var.) Azerbaidjan.

**I. Ewbankiana** Foster in *Gard. Chron. Ser. 3.* xxix. 1901. i. 397.

Hills north of Tabriz, Baba-Baghi, 15.5.29, No. 2492.

*Distrib.* N. Persia and Asia Minor.

The standards and falls appear to be less acute than they should be for the type, according to description, and the veins are continuous.

**I. persica** L. *Sp. Pl.* 40 (1753).

Desert hills south of Tabriz, 19.3.26, No. 1324 ; 3.28, No. 2216. Various shades of pale mauve to pale yellow flowers which are often faintly scented. Known as " Noruz güli " in Turki, i.e. New Year flower.

*Distrib.* Asia Minor, N. Syria, Armenia, Persia.

**I. Polakii** Stapf in *Denkschr. Math.-Naturw. Cl. K. Akad. Wiss.* l. 20 (1885) (det. O. Stapf).

Hills south of Tabriz, 5.29, flowers purple or claret with brown-purple falls, No. 2489 ; cultivated at Kew from Tabriz material, 11.5.28.

*Distrib.* Persia (Haideri).

The broad standards and keeled spathes are worth notice.

**I. reticulata** M. Bieb. *Flor. Taur.-Cauc.* i. 34 (1808), var. **typica** Regel in *Gartenflora* xxii. 354 (1873).

Tabriz, in cultivation, 21.3.26, No. 1325, sweetly scented.  
var. **Krelagii** Regel l.c.

Hills north of Tabriz, 2.4.26, No. 1339.

*Distrib.* (of species as a whole) Caucasus and N. Persia.



An article describing the colour varieties of this species introduced into cultivation from N. Persia by Mr. Georg Egger, Secretary to the German Consul at Tabriz, appeared in *The New Flora and Sylva* ii. 37 (1929).

**I. paradoxa** Stev. in Mem. Soc. Nat. Mosc. v. 355 (1814).

Marand, north-west of Tabriz, 5.29, No. 2490.

*Distrib.* Armenia, N. Persia.

**I. songarica** Schrenk Enum. Pl. Nov. i. 3 (1841).

East of Lake Urmia, 25.5.26, flowers sky blue, No. 1593 ; under the red hills north of Tabriz, 5.29, No. 2491.

*Distrib.* Persia east to W. China.

**I. spuria** L. Sp. Pl. 39 (1753).

Urmia district, in a marshy hollow near the village of Hassar on the plain between the city and lake of Urmia, 5.26, No. 1548 ; 29.5.28, No. 2300. Tall and graceful with pale blue flowers.

*Distrib.* Cent. Eur. and Medit. Region.

#### AMARYLLIDACEAE.

**Ixiolirion montanum** Herb. Amar. 125, t. 20, f. 3 (1837).

Urmia district, 5.26, flowers blue, Nos. 1541, 1549 ; bulbs from near Tabriz, cultivated at Kew, 14.5.27, and 3.5.28.

*Distrib.* Palestine and Syria and E. Asia Minor to Persia, Afghanistan, and N. India.

In No. 1549 the anthers are up to 6 mm. long, in the other specimens 3.5-4 mm.

#### LILIACEAE.

**Allium Akaka** Gmel. ex Roem. et Schult. Syst. vii. 1132 (1830).

Near Tabriz, 5.26, flowers various shades of pink, Nos. 1444, 1485 ; 12.5.27, No. 1870 ; hills south of Tabriz, sweet scented, 5.28, No. 2219 ; cultivated at Kew from Tabriz bulbs, in flower 14.5.27. The width of the leaves varies considerably and in the desert hills south of Tabriz there is no peduncle visible.

*Distrib.* Armenia, N. Persia.

**A. Ampeloprasum** L. Sp. Pl. 294 (1753), var. **atroviolaceum** Regel et var. **leucanthum** Regel All. Monogr. 54 (1875).

Hills south of Tabriz, in cornfields and gardens, very common, flowers in June and July, purple and silver-tepalled varieties, 22.6.28, No. 2356.

*Distrib.* (of species) Medit. Region. Colour varieties here and there in species area.

**A. dilutum** Stapf in Denkschr. Math. Naturw. Cl. K. Akad. Wiss. l. 13 (1885).

Near Zindjanab, sweet-scented, 3.5.28, flowers pink to purple, No. 2222.

*Distrib.* N. Persia.

- A. laceratum** Boiss. et Noë in Boiss. Diagn. Ser. II. iv. 112 (1859).  
Urmia district, Band, 20.5.26, flowers deep pink, No. 1564;  
common in open grassy meadows near Band, 25.5.28, No. 2217.  
*Distrib.* Armenia, Persia.
- A. rotundum** L. Sp. Pl. ed. 2. 423 (1762).  
Mishou Dag, 30.8. 28, flowers red, No. 2481.  
*Distrib.* Cent. Eur. and Medit. Region.
- A. rubellum** M. Bieb. Flor. Taur.-Cauc. i. 264 (1808).  
Above Zindjanab, Sahand Range, 25-27.6.29, flowers red, No. 2518.  
*Distrib.* S. Russia, Caucasus, E. Medit. Region to N. India.
- A. rubellum** M. Bieb., var. **parviflorum** Ledeb. Flor. Ross. iv. 171 (1853).  
Hills south of Tabriz, 16.5.28, flowers red, No. 2301.  
*Distrib* (of var.) S. Russia, Caucasus.
- Asparagus officinalis** L. Sp. Pl. 313 (1753).  
Near Tabriz, cultivated in a garden, 26.5.27, No. 1868.  
*Distrib.* E.N. Temp. Region.
- Bellevalia ciliata** Nees Gen. Pl. Monocot. ii. t. 42 (1835).  
Yam, 11.5.28, whitish, No. 2220.  
*Distrib.* Caucasus, Persia, Afghanistan.
- B. tabriziana** Turrill in Kew Bull. 1929, 234.  
Hills north of Tabriz, 10.4.27, No. 1775, flower-stalk buried in the sand almost up to the inflorescence, flowers pale blue or mauve, white or cream-coloured, with violet-black anthers.  
Endemic.
- Colchicum Kotschyi** Boiss. Diagn. Ser. I. xiii. 38 (1853).  
Yam, white tinged with pink at times, 21.8.27, No. 2084; under Mishou Dag, 7.8.27, s.n.  
*Distrib.* Asia Minor, Armenia, Persia.
- C. Szovitsii** Fisch. et Mey. Ind. Sem. Hort. Petrop. i. 24 (1834), var. **Freyunii** Stefanoff in Sbor. Balg. Akad. Nauk. xxii. 25 (1926).  
Hills south of Tabriz, 19.3.26, flowers white, Nos. 1327, 1328; early spring, 1928, No. 2214.  
*Distrib.* (of species) Armenia, Transcaucasus, N. and W. Persia.  
(of var.) N. Persia.
- Eremurus anisopterus** Regel. Gartenfl. xxii. 260 (1873).  
West of Zindjanab, 2.5.28, flowers white or flesh-coloured, No. 2242.  
*Distrib.* N. Persia, Afghanistan, Cent. Asia.
- Fritillaria karadaghensis** Turrill in Gard. Chron. 3rd ser. lxxxv. 242, 221 (1929). *F. foliosa* Bornm. in Fedde Repert. xxvii. 338/50 (1930).



Bulbs from the Kara Dagħ, North Persia, coll. *Egger*, cultivated in Tabriz, early spring, 1928, No. 2213 ; also in flower at Kew, 3.29. Endemic.

**Fritillaria Karelinei** *Baker* in Journ. Linn. Soc. xiv. 268 (1874) ; Bot. Mag. t. 6406 (1879).

Hills south-east of Tabriz, in full purple flower, 19.4.28, east of Tabriz, 17.4.28, No. 2212 ; 5.29, No. 2494.

*Distrib.* N. Persia, Afghanistan, Baluchistan, Cent. Asia, Sind.

**F. Olivieri** *Baker* in Journ. Linn. Soc. xiv. 261 (1874).

Tabriz district, Mt. Heron, 5.29, flowers purple brown, No. 2493.

*Distrib.* N. Persia.

**Gagea confusa** *Terracc.* in Boll. Soc. Ort. Palermo ii. repr. 5 (1904) ?

Mishou Dagħ, 22.5.27, flowers yellow (No. 1795).

*Distrib.* Russia, Persia.

**G. reticulata** *Roem. et Schult.* Syst. vii. 542 (1829).

On the hills south of Tabriz, 31.3.26, flowers yellow, No. 1330 ; 9.4.26, Nos. 1361, 1362.

*Distrib.* Medit. Region.

**Hemerocallis fulva** *L.* /Sp. Pl. ed. 2. 462 (1762)

In gardens near Tabriz, 6.26, flowers orange, No. 1752.

*Distrib.* E.N. Temp. Region.

**Merendera trigyna** *Stapf* in Denkschr. Math.-Naturw. Cl. K. Akad. Wiss. I. 18 (1885) ; Woron. in Acta Hort. Petrop. xxviii. 431 (1909). *M. caucasica* *M. Bieb.* Flor. Taur.-Cauc. i. 293, 426 (1808), iii. 281 (1819).

Hills north of Tabriz, 2.4.26, flowers white or pinkish, No. 1341 ; Yam, early spring, 1928, No. 2215.

*Distrib.* Armenia, Caucasus, Persia.

**Muscari caucasicum** *Boiss.* Flor. Or. v. 293 (1884).

Cultivated at Kew from bulbs near Tabriz, 14.5.27.

*Distrib.* Caucasus.

**Ornithogalum montanum** *Ten.* Prodr. Flor. Nap. xxii. (1811).

Yam Pass, 22.5.27, flowers white, No. 1871 (?) ; 11.5.28, No. 2218.

*Distrib.* S. Italy and Sicily east to Caucasus and N. Persia.

**O. pyrenaicum** *L.* Sp. Pl. 306 (1753).

Top of Mishou Dagħ, 19.7.28, flowers white, No. 2369.

*Distrib.* Cent. Eur. and Medit. Region.

**Tulipa cuspidata** *Stapf* in Denkschr. Math.-Naturw. Cl. K. Akad. Wiss. I. 17 (1885) var. ?

Gardens in Tabriz, 4.29, No. 2498. The flowers are scarlet and larger than in wild material at Kew.

*Distrib.* Persia.

**T. montana** *Lindl.* Bot. Reg. xiii. t. 1106 (1827).

Near Zandjan, 3.5.28, flowers red, No. 2223 ; 5.29, No. 2497 (var. ?)

*Distrib.* Persia.

**T. polychroma** *Stapf* in Denkschr. Math.-Naturw. Cl. K. Akad. Wiss. I. 18 (1885).

South of Tabriz on the desert hills, 30.3.26, flowers white tinged with cream, pink, or blue, No. 1329 ; hills north of Tabriz, 4.28, No. 2224.

*Distrib.* N. and W. Persia, ? Afghanistan.

Bornmüller in Beih. Bot. Centrbl. xxiv. 100 (1908) considers this as synonymous with *T. Buhseana* Boiss. [Diagn. Ser. II. iv. 98 (1859)], which he reduces to a variety of *T. humilis* Herb. I have seen no type or authenticated material of *T. Buhseana* Boiss. and for the time therefore retain Stapf's name.

**T. silvestris** *L.* Sp. Pl. 305 (1753).

In gardens round Tabriz, 22.4.27, flowers yellow, No. 1869 ; cultivated at Kew from Tabriz bulbs, 12.4.28.

*Distrib.* Medit. Basin.

**T. violacea** *Boiss. et Buhse* Aufz. 211 (1860).

Urmia, 5.29, flowers pale violet pink, No. 2496.

*Distrib.* N. and W. Persia.

**T. violacea** *Boiss. et Buhse*, var. **pallida** *Hauskn.* ex Bornm. in Beih. Bot. Centrbl. xxiv. 100 (1908).

North of Tabriz, Kara Dagh, coll. *Egger*, spring, 1927, No. 2173.

*Distrib.* (of var.) N. and W. Persia.

#### NAIADACEAE.

**Triglochin maritimum** *L.* Sp. Pl. 339 (1753).

Urmia, 5.28, No. 2267a ; Yam, 12.7.28, No. 2394.

*Distrib.* Widely spread in N. Temp. Region.

#### GRAMINEAE.

**Aegilops triuncialis** *L.* Sp. Pl. 1051 (1753).

Tabriz, weed in garden, 22.6.27, No. 2201.

*Distrib.* Medit. Region.

**Agropyron Buonapartis** *Th. Dur. et Schinz* Consp. Flor. Afric. v. 1894, 936 (1895).

Near Tabriz, 16.5.26, No. 1506.

*Distrib.* N. Afr. and Orient.

**A. repens** *Pal. de Beauv.* Agrost. 102 (1812).

Near Tabriz, 5.26, No. 1638.

*Distrib.* N. Temp. Region.

**Alopecurus myosuroides** Huds. Flor. Angl. 23 (1762).

Near Tabriz, 11.5.27, No. 2203.

*Distrib.* E.N. Temp. Region.

**Atropis festucaeformis** Schur Enum. Pl. Transsilv. 780 (1866),  
sensu Boiss. Flor. Or. v. 615 (1884).

Near Tabriz, 5.26, No. 1633 ; 27.5.27, Nos. 2197, 2198.

*Distrib.* W. Eur., Medit. Region, Armenia, Caspia.

**Avena abyssinica** Hochst. ex. A. Rich. Tent. Flor. Abyss. ii. 415  
(1851) (det. C.V.B. Marquand).

Near Tabriz, 22.6.27, No. 2202a.

*Distrib.* Medit. Region and E. Afr. as a weed.

No oats are cultivated in Azerbaidjan and no native names are given to them.

**A. fatua** L. Sp. Pl. 80 (1753).

Yam, apparently wild in fields, 6.28, No. 2441.

*Distrib.* E.N. Temp. Region.

**A. sterilis** L. Sp. Pl. ed. 2, 118 (1762).

Weed in garden near Tabriz, 22.6.27, No. 2202.

*Distrib.* Medit. Region and as an introduced weed in many parts of the world.

**Bromus japonicus** Thunb. Flor. Jap. 52, t. 11 (1784).

Near Tabriz, 27.5.27, No. 2206.

*Distrib.* Cent. Eur., E. Medit. Region, and as a weed in many parts of the world.

**B. macrostachys** Desf. Flor. Atlant. i. 96. t. 19 (1798), var.  
**triaristatus** Hack. Flora lxii. 155 (1879).

Near Tabriz, 6.28, No. 2444 ; 6.29, No. 2550.

*Distrib.* (of species) E.N. Temp. Region.

(of var.) Asia Minor east to Afghanistan.

**B. tectorum** L. Sp. Pl. 77 (1753).

Near Tabriz, 5.26, No. 1637 ; 5.6.27, No. 2205.

*Distrib.* E.N. Temp. Region.

**Cynodon Dactylon** Pers. Syn. Pl. i. 85 (1805).

Near Tabriz, 9.7.27, No. 2187.

*Distrib.* Cosmopolitan.

**Dactylis glomerata** L. Sp. Pl. 71 (1753).

Tabriz, weed in garden, 5.26, No. 1635 ; 5.6.27, Nos. 2192, 2193,  
2194.

*Distrib.* E.N. Temp. Region.

**Eragrostis minor** Host. Gram. iv. 15 (1809).

In garden, near Tabriz, 5.28, No. 2442.

*Distrib.* E.N. Temp. Region.



**Hordeum murinum** L. Sp. Pl. 85 (1753), var. **leporinum** Richter Pl. Eur. i. 130 (1890).

Tabriz, weed in garden, 5.26, No. 1636 ; 5.6.27, No. 2199.

*Distrib.* (of species) E.N. Temp. Region.

(of var.) Medit. Region.

**Lolium perenne** L. Sp. Pl. 83 (1753).

Near Tabriz, weed in garden, 27.5.27, No. 2189.

*Distrib.* Eur. and Medit. Region.

**L. multiflorum** Lam. Flor. Fr. iii. 621 (1778).

Near Tabriz, 5.28, No. 2446.

*Distrib.* Eur. and Medit. Region.

**L. persicum** Boiss. et Hohen. in Boiss. Diagn. Ser. i. xiii. 66 (1853).

Tabriz, weed in garden, 27.5.27, No. 2190.

*Distrib.* Armenia, N. Persia, Afghanistan, Baluchistan.

**Melica Cupani** Guss. Suppl. Flor. Sic. Prodr. 17 (1832), var. **inaequiglumis** Boiss. Flor. Or. v. 590 (1884).

Hills south of Tabriz, 8.28, No. 2445 ; Mishou Dagh, 5.8.29, No. 2603.

*Distrib.* (of species) Medit. Region and Cent. Asia.

(of var.) Asia Minor, Iraq, Armenia, Persia.

**Panicum miliaceum** L. Sp. Pl. 58 (1753).

Yam, fields, 8.9.29, No. 2620. Turki "Dari."

*Distrib.* Eur. and Asia, as a cultivated plant, ruderal, or weed.

**Phleum asperum** Jacq. Coll. i. 110 (1786), var. **ciliatum** Boiss. Flor. Or. v. 482 (1884).

Near Tabriz, 6.27, No. 2204.

*Distrib.* (of species) E.N. Temp. Region.

(of var.) Caucasus, Persia, Afghanistan.

**Poa bulbosa** L. Sp. Pl. 70 (1753), viviparous.

Weed in garden near Tabriz, 11.6.27, No. 2200.

*Distrib.* E.N. Temp. Region.

**P. pratensis** L. Sp. Pl. 67 (1753).

Tabriz, weed in garden, 5.26, No. 1634 ; 27.5.27, No. 2196.

*Distrib.* N. Temp. Region.

**P. pratensis** L. var. **angustifolia** Sm. Flor. Brit. 105 (1800).

Tabriz, weed in garden, 27.5.27, No. 2195.

*Distrib.* (of var.) here and there in species area.

**Setaria italica** Pal. de Beauv. Agrost. 51 (1812).

As a weed in the millet fields, Yam, 8.9.29, No. 2619.

*Distrib.* Nearly cosmopolitan as a weed and ruderal.

**S. verticillata** *Pal. de Beauv.* Agrost. 51 (1812).

Near Tabriz, weed in garden, 7.27, No. 2143. Two pieces of *S. viridis* *Pal. de Beauv.* mixed with the material.

*Distrib.* Old World.

**S. viridis** *Pal. de Beauv.* Agrost. 51 (1812).

Tabriz, weed in garden, 7.27, No. 2144; 12.7.27, No. 2188.

*Distrib.* E.N. Temp. Region.

**Stipa barbata** *Desf.* Flor. Atlant. i. 97, t. 27 (1798), var.

**Szovitsiana** *Hack.* in Denkschr. Acad. Wien i. 8 (1889) et in Mon. Jard. Bot. Tiflis xxiv. 19 (1912).

Near Tabriz, 5.28, No. 2443.

*Distrib.* (of species) Medit. Region.

(of var.) Armenia, Persia, Turcomania, Caucasus.

**Triticum sativum** *Lam.* Encycl. ii. 554 (1786), var. **erythro-**

**spermum** *Kornicke* Syst. Übers. ii. (1873); Körn u. Wern. Handb. Getr. i. 46, t. I. f. 3 (1885), ii. 337 (1885).

Near Tabriz, 6.27, No. 2191.

*Distrib.* Cultivated—cosmopolitan.

#### CONIFERAE.

**Juniperus communis** *L.* Sp. Pl. 1040 (1753).

Upper regions of Mishou Dagh, 21.8.27, No. 2117.

*Distrib.* N. Temp. Region.

#### GNETACEAE.

**Ephedra nebrodensis** *Tin.* in Guss. Flor. Sic. Syn. ii. 638 (1844),

var. **procera** *Stapf* in Denkschr. Math.-Naturw. Cl. K. Akad. Wiss. lvi. 80 (1889).

Hills north of Tabriz, 29.9.29, No. 2628.

*Distrib.* (of species) Medit. Region.

(of var.) S. Balkan Penins., Asia Minor, Armenia, Caucasus, Persia, Baluchistan, Afghanistan, Himalaya.

#### FILICES.

**Cystopteris fragilis** *Bernh.* in Schrad. Neues Journ. i. ii. 27 (1806).

Damp crevices in rocks in ravines, Mishou Dagh, 2.9.29, No. 2622.

*Distrib.* Nearly cosmopolitan.

(Concluded).

### LIII.—MISCELLANEOUS NOTES.

EDWARD MORELL HOLMES.—The death of Mr. E. M. Holmes, Ph.C., F.L.S., on the 10th of September at the age of 88, removes one more distinguished correspondent of Kew. As a botanist Holmes was associated with two Directors of Kew on the Committees of Reference in Botany for the British Pharmacopoeia on behalf of

the General Medical Council of the United Kingdom, in 1898 with the late Sir William Thiselton-Dyer, and in 1914 with Sir David Prain. As a Pharmacist he received the distinction of being awarded the International Flückiger Medal (1897) and the International Hanbury Gold Medal (1915) in Materia Medica, and his knowledge of drugs and medicinal plants was probably unrivalled. He constantly sought the assistance of Kew in the determination of those that were unfamiliar to him and which were also new to science or the trade, and the last of his many letters to Kew, relating to the apparently decorticated seeds of *Plantago ovata*, was received a few days only before his death. His numerous articles in the Pharmaceutical Journal—three hundred at least—on drugs and medicinal plants are evidence of his ability to unravel problems in his own special subject. Among his many literary activities he contributed the articles under G. to K. on Drugs to the Encyclopaedia Britannica (8th Ed.).

Holmes was a born collector and systematist. He had a very good general knowledge of the British Flora, including the Bryophyta and Cellular Cryptogams, and was a specialist on Lichens and Marine Algae. He also made considerable collections of Lepidoptera and Coleoptera. He published many papers on Seaweeds, the most important of his contributions being the Revised List of British Marine Algae compiled by himself and E. A. L. Batters (Ann. Bot. 1890). He also prepared a set of "Algae Britannicae Rariores Exsiccatae" which were issued in twelve fasciculi. On Seaweeds he was a recognised authority and his retentive memory was never at fault as to the exact localities on the shore where rare forms were to be found.

In 1900 Holmes was President of the Pharmaceutical Conference in London and his address, published in the Year Book of Pharmacy, displays his wide interests both in the commercial and in the scientific lines of development of that subject.

He retired in 1922 from the service of the Pharmaceutical Society at Bloomsbury Square, where as Curator of the Society's Museum he had served for fifty years with conspicuous ability. He continued to reside at Sevenoaks, and to the end of his long and busy life he maintained his interest and enthusiasm in botany and carried on his various activities with undiminished vigour.

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SIR FRANCIS WATTS, K.C.M.G.—We record with deep regret the death of Sir Francis Watts, on September 26th, in Trinidad. Sir Francis's connection with Kew has been a long and intimate one, from the commencement of his Colonial career in 1889, when he was appointed Analytical Chemist, Antigua, until the close of his active life, devoted to the welfare of the West Indian Islands and the progress of Agriculture both there, in Mauritius and elsewhere.

Sir Francis was born in 1859 and went to Antigua after completing his studies at Mason's College, Birmingham. After nine years'



service in Antigua he occupied a similar post in Jamaica, but returned to the Leeward Islands in 1899 to take up the duties of Government Chemist and Superintendent of Agriculture, when Sir Daniel Morris was Imperial Commissioner of Agriculture for the West Indies.

On Sir Daniel's retirement from this post in 1906 he succeeded him in that important office and ably carried on the valuable work of the Department on the lines so well laid down by his predecessor, and greatly added to the prestige of the Department. Sir Francis carried on the work of the Imperial Department in Barbados until the Imperial College of Tropical Agriculture was founded in Trinidad, when he transferred the office of the Commissioner to that island and retained both that post and the Principalship of the College (*K.B.* 1922, p. 303) until his retirement in 1924.

It is in connection with the establishment of the College that Sir Francis Watts's name will be principally retained in grateful remembrance, since it was largely due to his efforts that this important project came into being. In recognition of his services as the first Principal of the College he was made 'Principal Emeritus' on his retirement, and his portrait, which was presented to him, very fittingly adorns the College. He received the honour of the C.M.G. in 1904 and the further honour of the K.C.M.G. in 1917 (*K.B.* 1917, p. 84).

During his residence in Trinidad he entered fully into the public life of the island with the customary enthusiasm which marked his activities up to the close of his life, and he filled the office of President of the Agricultural Society with conspicuous ability. He was nominated an official member of the Legislative Council of Trinidad and Tobago in 1928, and his advice on agricultural matters was constantly asked for and as freely given. He had only recently, in August last, returned from Mauritius, whither he had been sent, as a special Commissioner, to investigate the condition of the sugar industry in that island. His death will be mourned throughout the Empire; for the far-reaching effects of his valuable labours extended beyond the limits of the West Indian Islands.

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JOHN MASTERS HILLIER.—We greatly regret to record the death of Mr. J. M. Hillier, who retired in 1926 after forty-seven years' service at Kew, for the last twenty-five of which he was Keeper of the Museums (*K.B.* 1926, p. 220). On retirement Mr. Hillier went to live at Osterley, and had recently returned to his home after his summer holiday, when he contracted pneumonia and died suddenly on the 5th October.

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ADOLF ENGLER.—We regret to announce the death of Dr. Heinrich Wilhelm Adolf Engler, late Professor of Botany in the University of Berlin, and Director of the Botanical Garden and Botanical Museum at Dahlem, Berlin, who passed away at Dahlem on the 10th October, in his 87th year. In him Systematic Botany and Plant-Geography have lost their *doyen*. So intimately is his

work in these two fields linked up with the modern progress of Botany, and so potent is still his influence, that a full account of his long and remarkably intensive and many-sided activity is obviously beyond the scope of this notice. We may, however, refer to the address given by Professor Poulton at the anniversary meeting of the Linnean Society of London on May 24, 1913, when he handed over to a representative of the German Government the Linnean Gold Medal which the Council of the Society had awarded to Professor Engler. In this address a condensed appreciation of Engler's work up to 1913 may be found, but that year by no means marked the conclusion of his contributions to Botany.

A long series of papers of limited extent followed, one of the last being an article on *Podostemonaceae Americanae Novae* (1927); his *Monograph of Saxifraga* (1872), up to then the standard work on this genus, was superseded by a new and most comprehensive monograph of over 700 pages in the *Pflanzenreich* (1916-1919), as were his *Araceae*, published in A. De Candolle's *Monographiae* (1879) by an equally comprehensive treatise, occupying 9 Hefte of the same series, the last issued in 1920; his "Syllabus," a concise summary of his concept of Botanical Taxonomy, went from edition to edition, ever keeping pace with the progress made in that field until in 1925 it reached its 10th edition. At the same time Engler continued with unbroken energy the direction and editorship of the "*Pflanzenreich*" which had begun in 1900, so that by the time of his death it covered over sixty families. In addition to this a new revised edition of the "*Natürliche Pflanzenfamilien*," also under his direction and editorship, was commenced in 1924, and of this eleven volumes have been produced so far, one of them, containing "Brief Outlines of the Flowering Plants and Principles of their Systematic Arrangement," being by Engler himself (1926). The *Botanische Jahrbücher*, begun in 1881, continued likewise under his direction, the last volume (1929-30) for which he was responsible bearing the number 63. Nor did his interest in the problems of plant distribution flag, as is proved by the last volumes of his "*Character Pflanzen Afrikas*" (1916-21) and a volume on the vegetation of tropical Africa (1925), but above all by the continuation (as joint editor with Professor Drude) of the splendid series of "*Die Vegetation der Erde*," of which so far twenty volumes have appeared, including those just mentioned. When he finally retired in 1921 he still retained up to the last a considerable measure of influence in the policy of the establishment which he had directed through so many years.

Engler was born at Sagan, Lower Silesia, on March 25th, 1844. From 1863 he studied at Breslau, where he came under the influence of Goepfert and Cohn, and obtained a Doctor's degree with his dissertation "*De Genere Saxifraga*" in 1866. He remained at Breslau acting as schoolmaster at the St. Maria Magdalene Gymnasium until 1871, when he was appointed Custos of the Royal Herbarium

at Munich. When, in 1878, Eichler left Kiel for Berlin as successor to Alexander Braun, Engler took Eichler's place as Professor of Botany and Director of the Botanic Garden at Kiel. It was here that he wrote his *Entwicklungsgeschichte der Pflanzenwelt* (1879-1882), and started the *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* (1881). Six years later (1884) he was, on the death of Goeppert, called to the Chair of Systematic Botany in the University of Breslau and to the directorship of the Botanical Garden there. Whilst at Breslau he conceived, in conjunction with his friend Prantl, then Professor of Botany in the Forestry School at Aschaffenburg, the plan of the "*Natürliche Pflanzenfamilien*," the first part of which appeared in 1888. Early in the next year he moved to Berlin where a Professorship in Botany had become vacant by the death of Eichler. Here at last he found the field worthy of his ambition and genius. A Chair and a Garden made famous through a succession of illustrious botanists, a city which had recently become the focus of a new colonial empire whose immense vegetable wealth called for exploration and study, and a liberal far-seeing government gave him his opportunity. The old Botanic Garden at Schöneberg had by that time become buried in a sea of houses and cried for removal to more open land. Dahlem on the south-western outskirts of the city was chosen for the site of the new Garden. It afforded ample space, but was hardly ideal in other respects. However, Engler's energy and indefatigable power of work triumphed also here. Begun in 1897, the new Garden, with its grandly conceived outlay, its glass-houses and magnificently equipped institutions, gradually grew towards completion. Partially opened as early as 1903, it presented itself in its final shape in 1910 to the foreign Botanists who had been invited to inspect it.

Engler was now approaching the proverbially allotted span of life and one might have expected him to slow down, but his amazing vitality—the more amazing as he was in his younger years by no means a robust man—continued. Early given to travelling and to study in the field, he had visited most parts of Europe and the Mediterranean beyond it, and when over 60 years of age he travelled through South and East Africa, India and Malaya; finally, when nearly 70, he encircled the world by way of Siberia, Japan, and North America (March-November, 1913). It was only after his retirement that he allowed himself comparative rest from desk and Herbarium work, and not until the last year of his life did he show decided signs of increasing physical infirmity. Mentally he remained fresh and interested in the progress of his science almost to the last.

His achievements were fully recognised far beyond the frontiers of his native country. He was a member of the Berlin Academy of Sciences and a corresponding member of many other Academies in Europe and America, a Doctor Honoris causa of the Universities of Cambridge (England), Geneva, Upsala, and Cape Town, and a foreign member (1888) and Gold Medalist (1913) of the Linnean Society of



London, but most lasting will be the renown which he has created for himself through his work, and the School which he has built up all over the world, as the worthy successor and rival of the De Candolles and Hookers.

O. S.

ERNEST HENRY WILSON.—The tragic death, on the 15th October last, of Dr. E. H. Wilson, M.A., D.Sc., V.M.H., as the result of a motor car accident in which his wife also lost her life, came as a sad and sudden shock to botanists and horticulturists alike throughout the world. His car apparently skidded on a greasy road near Worcester, Massachusetts, crashed through a fence, and dropped down a steep embankment. In Wilson's death botanists and horticulturists have lost one of their most famous and intrepid explorers, whose name will always be linked with that vast country whose treasures he introduced to our gardens, and with the famous Arnold Arboretum, of which he had for the past three years been Keeper.

Wilson was born at Chipping Campden, Gloucestershire, on February 15th, 1876. In 1892 he entered Birmingham Botanic Gardens, and came to Kew in January, 1897. In the practical work of the Gardens, and in the lecture room, his ability was soon evident. He gained the "Hooker Prize" of the Mutual Improvement Society for an essay on Coniferae, and in the lecture courses he occupied leading places. Botany as a science soon attracted him, and he gained a Studentship at the Royal College of Science, South Kensington, with a view to training in botany for the teaching profession.

His first step towards distinction came in 1899, when Messrs. Veitch applied to the then Director of Kew, Sir William Thiselton-Dyer, to recommend a man suitable to send to China as a collector. On Sir William's advice Wilson was selected, and thus began the first of a series of plant-collecting expeditions which made his name famous in horticultural and botanical circles all over the world. He returned from his first expedition in 1902, but set out again in 1903 for another part of China and did not return till 1905. His fame as a plant-collector was now becoming established, and 1907-09 found Wilson again visiting China, this time chiefly on behalf of Harvard University. A fourth trip followed in 1910-11.

The results of his labours up to this time are shown in the "*Plantae Wilsonianae*," which contains descriptions of no fewer than 2,716 species and 640 varieties of plants, of which nearly nine hundred were new introductions.

Wilson next made two journeys, in 1914 and 1917, to Japan, including Yakushima, Korea, Formosa, and other outlying parts of an Empire rich in botanical and horticultural treasures.

In 1919 Wilson was appointed Assistant Director of the Arnold Arboretum. The following year he began a two years' tour through Australia, New Zealand, Tasmania, Java, Singapore, the Federated Malay States, the greater part of India, East Africa, Rhodesia and South Africa.

On the death of Professor C. S. Sargent in 1927, he was appointed to take charge of the Arnold Arboretum with the title of Keeper. The confidence placed in him was amply justified, and during the last three years he showed, in a remarkable degree, the abilities of administrator, botanist and gardener.

The love of travel and the thirst for knowledge were ever present with him, and he was never happier than when on botanizing rambles, or visiting notable gardens and nurseries. Wilson had a vast knowledge of the country within week-end motoring distance of Boston. He knew, and had photographed, many famous specimen trees in Massachusetts and the adjoining states.

A tireless worker, Wilson found time to write numerous books :— *A Naturalist in Western China*, 1913 ; *Cherries of Japan*, 1916 ; *Conifers and Taxads of Japan*, 1916 ; *The Romance of our Trees*, 1920 ; *A Monograph of Azaleas* (in collaboration with Rehder), 1921 ; *Lilies of Eastern Asia*, 1925 ; *America's Greatest Garden : the Arnold Arboretum*, 1925 ; *Aristocrats of the Garden*, 1926 ; *Plant Hunting*, 1927 ; *China, Mother of Gardens*, 1929 ; and *Aristocrats amongst Trees*, 1930. He contributed numerous papers to botanical, horticultural and other periodicals. One of particular interest was on *Northern Trees in Southern Lands*, which appeared in the *Journal of the Arnold Arboretum*, vol. iv. pp. 61-90, 1923.

Amongst the honours he received were the Victoria Medal of the Royal Horticultural Society ; the Veitch Memorial Medal ; the Geoffroy St. Hilaire Gold Medal ; the George Robert White Medal and The Rhododendron Society Cup. He was President of the Kew Guild in 1922. Harvard University conferred on him the honorary degree of M.A., and as recently as June of this year he was given the D.Sc. of Trinity College, Hartford, Conn. He was a fellow of the American Academy of Arts and Sciences, and a Trustee and Chairman of the Exhibitions Committee of the Massachusetts Horticultural Society.

A. O.

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**International Address Book of Botanists.**—At the Final Plenary Meeting of the Fifth International Botanical Congress, on the 23rd August, 1930, a Resolution was carried unanimously to the effect that an Address Book of the Botanists of the World should be prepared and published.

An International Committee was appointed to carry out this Resolution :—Prof. L. Diels, Director of the Botanic Gardens, Berlin ; Dr. E. D. Merrill, Director-in-Chief, New York Botanical Gardens ; Dr. T. F. Chipp, Assistant Director, Royal Botanic Gardens, Kew (to whom communications should be addressed).

It is intended to follow the general scheme of Dörfner's *Botaniker Adressbuch*, Ed. 3, 1909, the arrangement to be by countries, arranged alphabetically under each continent.

There will be two sections under each country :—

A list of (a) Botanical Societies ; (b) Institutions wholly or chiefly botanical ; (c) Educational Institutions in which there is a distinct botanical department.

A list of botanists, both professional and non-professional.

In applied technical subjects such as forestry, agriculture and horticulture, only those working in the botanical aspects of the subject will be included.

It is hoped to collect the necessary information by the end of April, 1931.

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**Imperial Botanical Conference, 1930.**—The Conference was held on 15th August, 1930, at the Imperial College of Science and Technology, South Kensington, London, the President, Dr. A. W. Hill, C.M.G., F.R.S., being in the Chair. In addition to a number of British Botanists, there were present delegates from fourteen overseas Dominions or Colonies, and from four Overseas Universities or Research Institutes.

The Reports of the various Committees set up by the Imperial Botanical Conference, 1924, were presented.

It was decided that an Imperial Botanical Conference should take place in England in 1935, shortly before the Sixth International Botanical Congress, which is to be held in that year in Holland.

The following Interim-Committee was appointed :—The Director of Kew (Convenor); the Keeper of Botany, British Museum (Natural History); the Professors of Botany at Oxford and Cambridge; a Professor of Botany of the University of London (to be nominated by the Chairman of the Board of Studies of the University); one representative of the Dominion Office, and one representative of the Colonial Office.

It was decided that this Committee should summon a Meeting of British botanists in the near future for the purpose of appointing an Executive Committee for the said Conference.

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**Museums of Economic Botany.**—The recent publication of the fourth edition of the Guide to Museum No. 1 at the Royal Botanic Gardens, Kew, completes the revision of the Guides to the four Museums. The Museums are devoted to the exhibition of specimens of the Economic Products of Plants and the collection is divided in the following manner :—Museum No. 1 includes the products of Dicotyledonous Plants; Museum No. 2 is devoted to specimens of Monocotyledonous Plants; Colonial Timbers are shown in Museum No. 3, and Museum No. 4 is confined to specimens of timbers which have been grown, manufactured or collected in the British Isles and to the practice of British forestry generally. Owing to the attention at present being paid to Economic Botany, a subject which teachers of geography tend more to include in their curriculum, these Guides, now revised, will be found to be particularly useful not only to visitors to the Museums, but also for general consultation in the library and the home. The Guides include information about such important subjects as timbers, fibres, vegetable oils, drugs, tans and dyes, rubbers, beverages, fruits and similar subjects. The Guide to



Museum No. 1 is priced at 2s. *od.*, by post 2s. 2*d.* ; those to Museums Nos. 2 and 3 are 1s. *od.*, by post 1s. 1½*d.* ; and that to Museum No. 4 1s. *od.*, by post 1s. 2*d.*, and all are obtainable in the Museums, at the Publications Kiosk in the Gardens, or on application to the Curator of the Gardens.

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**Cacao Pollination Studies.**—The important question of pollination in Cacao, connected as it is with the problem of hybrid cacao (see *K.B.*, 1929, pp. 126-129), has until recently been little understood, and continues to receive increasing attention from those engaged on work with the crop. Sterile cacao trees, which produce apparently normal flowers but fail to set fruit, are known to occur commonly in the plantations of cacao-growing countries. A possible cause of this sterility, at least in so far as Ceylon is concerned, has been investigated by Mr. J. C. Haigh, Assistant Mycologist in the Department of Agriculture. Mr. Haigh's interesting report, on the germination tests he has made with cacao pollen, which has been forwarded to Kew by the Director of Agriculture, Ceylon, is here reproduced, since it is likely to be of value to those working on cacao in other parts of the Empire :—

“ Germination tests have been carried out with pollen from a sterile cacao tree at the Experiment Station, Peradeniya. The tree bears abundant flowers but has never been known to set a pod. Comparative tests were carried out at the same time with pollen from a tree (No. 5, “ B ” cacao) that in the last three series of yearly records has produced respectively 119, 108 and 105 pods.

The flower of *Theobroma Cacao* opens in the early morning ; advantage was taken of this fact to ensure that only fresh pollen was used for the tests. In the evening all opened flowers were removed from one branch of each of the trees under examination, thereby assuring that the flowers picked for experiment next morning were newly opened. The flowers were picked in the early morning and the pollen from them was sown on 1·5 per cent. agar in petri dishes. Five flowers were taken from each tree per day and the pollen from each anther was sown separately ; twenty-five pollen masses per tree per day were thus obtained. Normal pollen germinates in a few hours in a moist atmosphere, but for convenience the pollen was examined twenty-four hours after sowing. Germinative power was judged by the percentage of pollen grains that had produced a germ tube. From the good tree 4,664 pollen grains were examined, of which 3,379, or 72·4 per cent., had produced a germ tube in twenty-four hours ; from the sterile tree 4,191 pollen grains were examined, of which only 15, or 0·36 per cent., had germinated in the same length of time. Samples of pollen from the sterile tree were kept for five days, but no increase in germination percentage was observed. Pollen from the good tree was seen to germinate a few hours after sowing. The only observable difference between the pollen from the two trees was that that from the sterile tree contained

a small percentage of larger, thin-walled grains. The normal pollen grain examined was about  $20\ \mu$  in diameter and had a thick wall; the larger grains had a thin wall and were about  $30\ \mu$  in diameter.

The above tests show that the failure to germinate of the pollen of the sterile tree is a factor responsible for the sterility of the tree, since self-fertilisation is impossible. It is generally held that the cacao flower is in the main self-fertilised, but Harland\* has shown that cross-fertilisation occurs in cacao; it is still necessary, therefore, in accounting for the complete sterility of this tree, to explain the failure of cross-pollination. A detailed investigation will probably be necessary before this explanation is found; in the meantime a few simple hand pollinations have been made, using pollen from the good tree of the germination tests. It is perhaps of interest to note that similar tests carried out in the West Indies failed to show a significant difference in germinative power between pollen from good and poor yielders, and that in such trees, which were incidentally the progeny of the same parent, sterility was due to a defect in the female part of the flower."

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**Jelutong.**—The production of jelutong in Malaya and Borneo continues to increase, the bulk of the output being taken by the U.S.A., where it is used as a substitute for chicle in the manufacture of chewing-gum. Chicle, the coagulated latex of the *Sapodilla* (*Achras sapota* L.), derived principally from Central America, commands a higher price than jelutong. The high relative cost of collection of chicle, combined with the fact that supplies are rapidly diminishing as a result of destructive tapping methods, renders it probable that the demand for jelutong will continue to increase. Borneo jelutong is derived from *Dyera Lowii* Hk. f., a tree confined to the swamps. In Malaya the product is derived from *Dyera costulata* Hk. f. and *Dyera laxiflora* Hk. f., two species occurring chiefly on flat land and low hills at altitudes below 1500 feet. There does not appear to be any intrinsic difference in the jelutong of these three species, though the Malayan product, owing to better methods of preparation, is generally preferred and commands an enhanced price. It has been found from experimental work in Malaya that the exercise of certain precautions in coagulation and in the agents used as coagulants results in a markedly superior product. Iron, from the use of rusty tins, is now known to cause oxidation and subsequent deterioration of the finished product. Consequently attempts are being made to induce collectors to refrain from using as coagulating vessels, iron receptacles or wooden boxes caulked with clay, which also contaminate the product.

It is estimated that in America, where the consumption of chewing-gum is steadily increasing, the markets are capable of absorbing about 5,000 tons of jelutong annually. The use of

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\* S. C. Harland, *Studies in Cacao. Part I. The Method of Pollination.* Ann. Appl. Biol. XII., 1925, p. 403.

chewing-gum is stated to be on the increase in parts of Europe and also in the north of England among factory hands. F. N. H.

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**Botanical Magazine.**—Part i of vol. cliv (1928) has now been published and contains the following plates: —*Lilium formosanum* Wallace (t. 9205), formerly considered a variety of *L. philippinense*, a native of the island of Formosa from the coast to 2400 m.; *Maxillaria elatior* Reichb. f. (t. 9206) from Central America, the plant figured having been collected by Dr. A. W. Hill near Cartago, Costa Rica, in 1924; *Rhododendron Albrechtii* Maxim. (t. 9207), from Northern and Central Hondo, Japan; *Codonopsis ovata* Benth. (t. 9208), a native of the Western Himalaya and South Kashmir; *Ligustrum Quihoui* Carr. (t. 9209), from China; *Primula sikkimensis microdonta* Stapf (t. 9210), a violet-flowered form of the familiar yellow *P. sikkimensis*, found from South-eastern Tibet to Western Szechuan; *Osmanthus fragrans* var. *aurantiacus* Makino (t. 9211), a Chinese plant only known in cultivation, the example figured having come from Col. D. V. Pirie's garden at Savennières; *Arisaema purpureogaleatum* Engl. (t. 9212), a native of Yunnan; *Leontopodium haplophylloides* Handel-Mazz. (t. 9213), a strongly lemon-scented Edelweiss from the mountains of Kansu and Northern Szechuan; *Acacia elata* A. Cunningham ex Benth. (t. 9214), from New South Wales, and *Veronica Teucrium* Linn. subsp. *thracica* Velenovský (t. 9215), a native of the Balkan Peninsula.

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**Size and Form in Plants.**—The thesis developed in this book\* is that the size of plant bodies is limited by the physiological application of the Principle of Similarity which expresses itself through the proportion of any limiting surface to the bulk of the tissues enclosed by it. As size increases the strength of a structure increases as the square of the linear dimensions, but the weight or mass as the cube, provided the form and material remain the same. Also, in solid figures, whatever their form, provided that on enlargement the same form be maintained, the surface increases as the square, and the bulk or volume as the cube of the linear dimensions. In the construction of any ordinary vascular plant there are three chief limiting tissue-surfaces:—1. the outer contour, 2. the endodermal sheath, and 3, the collective surface by which the dead tracheal system faces upon the living cells or tissues that embed it. It is the last which is chiefly considered by Prof. Bower. The anatomical structure of the axes of living and fossil *Pteridophyta* is described and often figured, in so far as it supports the author's contention that increase in size is only possible when correlated with modification of the contact surface of the tracheal system with the surrounding living tissues. It is shown that the proportion of surface-exposure of this system

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\* *Size and Form in Plants*, with special reference to the primary conducting tracts, by F. O. Bower. Macmillan & Co., Ltd., London, 1930, pp. 232 with 72 figures and 25 tables. Price 12s. 6d. net.



to the living cells is effected by: (A.) *Medullation*, forming a central pith, (B.) *Sculpturing* of the outer surface of the woody tract, which may take various forms, such as that of deep fluting, (C.) complete *Disintegration* of the xyletic mass as it appears in transverse section, (D.) general *Vitalisation*, living cells being scattered throughout the xyletic mass. The action of the 'Size-Factor' is said to be *morphoplastic*: that is, it induces by change such mature form as shall tend to maintain a due proportion of surface to bulk.

The views outlined above are given detailed expression for the Vascular Cryptogams and briefly extended to the *Spermatophyta*. There is throughout the work a tacit assumption that increase in size is an evolutionary tendency at least in the series used as illustrations of the accepted principles. This is certainly corrective to the very prevalent idea that evolution has been entirely or almost entirely a downgrade affair, so far as the size of existing plants is concerned. Yet though the hypothesis that the herbaceous habit is derived from and cannot give rise to the arboreal has, in its extreme forms, led to the publication of absurd suggestions, it is probable that the direction of evolution has been from the larger to the smaller organism at least as often as from the smaller to the larger. Correlation of form and size with decrease of the latter is not investigated in this book. It is of interest to note that the Monocotyledon type of stem structure is accepted as relatively primitive, and, excepting the palms, members of the group are predominantly herbaceous. It appears likely from a survey of modern knowledge on the subject that the Dicotyledons contain types both more primitive and, in important characters, more advanced than any Monocotyledons and that the polyphyletic origin of the latter group is very probable.

Prof. Bower uses the term "size" somewhat ambiguously both for bulk (volume) and for sectional area (generally given in terms of diameter). The concepts he emphasises open up many possibilities for new interpretations of morphological characters, both external and internal, and support the author's contention that "a new morphology of all tissues will have to be developed, somewhat of the nature of an internal organography, and complementary to the organography of external form."

W. B. T.

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**Strasburger's Text-Book of Botany.\***—The fact that this well-known textbook has reached its 6th edition in English shows that its well deserved popularity is being maintained. The new edition, translated from the 17th in German, follows the same general lines as the last which appeared in 1921. In the first half of the book general botany is dealt with from the morphological and physiological stand-points by Profs. Fitting and Sierp respectively. There is no great

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\*Strasburger's Text-Book of Botany. 6th English edition, translated from the 17th German edition by W. H. Lang. Macmillan and Co. Ltd., London, 1930. Price 31s. 6d.

alteration in the morphological section except that stelar evolution is considered more fully. On the other hand the physiology section has been largely re-written and improved by the incorporation of many comparatively recent developments in the subject and the introduction of a few illustrative graphs. The subjects of heredity, variability, and the origin of species have also been expanded and brought more up-to-date.

In the second half of the book, devoted to special botany, the different groups of the plant kingdom are dealt with in turn—Thallophyta, Bryophyta, and Pteridophyta by Prof. Harder, and Spermatophyta as in the last edition by Prof. Karsten. The Thallophyta and Pteridophyta sections have been largely re-written, and numerous comparative diagrams illustrating the life histories of some of the types dealt with have been introduced, and the arrangement and classification of the groups reorganised. Useful surveys have been appended at the ends of each of the separate groups of plants which help to prevent a mass of facts from obscuring the important points brought out in each of the groups.

The book should continue to be of great service to the student and as a book of reference.

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**Bacterial Plant Pathogens.\***—Dr. Charlotte Elliott's book is one which will be extremely useful as a work of reference. She has compiled a list of all known bacterial plant pathogens, and for each organism has given a brief description, synonyms, symptoms of affected plants, hosts, geographical distribution, means of control when known, and literature. The nomenclature followed is in accordance with Smith's modification of Migula's system, and the names of the organisms are arranged alphabetically.

The list of pathogens extends to p. 270. Following this is a list of non-pathogenic organisms which are cited in literature in connection with plant diseases, and a chart giving the chief morphological, cultural and physiological characters of the various organisms for purposes of comparison. The book is completed by an index of host-plants and bacteria.

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\* *Manual of Bacterial Plant Pathogens*, by Charlotte Elliott. Baillière, Tindall & Cox, London, 1930, pp. ix+349. Price 22s. 6d.

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